

# Excel 2007 Advanced: Part I

Stephen Moffat, The Mouse Training Company



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## Excel: Advanced Part I



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# **Excel 2007 Advanced**

Part I

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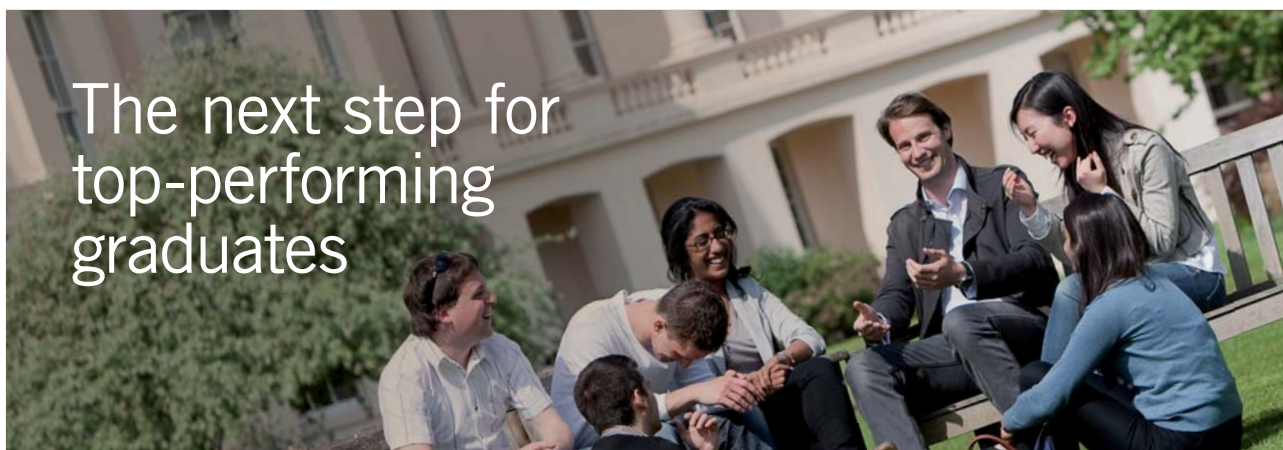
Excel 2007 Advanced: Part I

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ISBN 978-87-403-0033-8

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**CHALLENGING PERSPECTIVES**

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# Introduction

Excel 2007 is a powerful spreadsheet application that allows users to produce tables containing calculations and graphs. These can range from simple formulae through to complex functions and mathematical models.

## How To Use This Guide

This manual should be used as a point of reference following attendance of the introductory level Excel 2007 training course. It covers all the topics taught and aims to act as a support aid for any tasks carried out by the user after the course.

The manual is divided into sections, each section covering an aspect of the introductory course. The table of contents lists the page numbers of each section and the table of figures indicates the pages containing tables and diagrams.

## Objectives

Sections begin with a list of objectives each with its own check box so that you can mark off those topics that you are familiar with following the training.

## Instructions

Those who have already used a spreadsheet before may not need to read explanations on what each command does, but would rather skip straight to the instructions to find out how to do it. Look out for the arrow icon which precedes a list of instructions.

## Appendices

The Appendices list the Ribbons mentioned within the manual with a breakdown of their functions and tables of shortcut keys.

## Keyboard

Keys are referred to throughout the manual in the following way:

[ENTER] – Denotes the return or enter key, [DELETE] – denotes the Delete key and so on.

Where a command requires two keys to be pressed, the manual displays this as follows:

[CTRL] + [P] – this means press the letter “p” while holding down the Control key.

## Commands

When a command is referred to in the manual, the following distinctions have been made:

When Ribbon commands are referred to, the manual will refer you to the Ribbon – E.g. “Choose **HOME** from the Ribbons and then **B** for bold”.

When dialog box options are referred to, the following style has been used for the text – “In the **PAGE RANGE** section of the **PRINT** dialog, click the **CURRENT PAGE** option”

Dialog box buttons are shaded and boxed – “Click OK to close the **PRINT** dialog and launch the print.”

### Notes

Within each section, any items that need further explanation or extra attention devoted to them are denoted by shading. For example:

*“Excel will not let you close a file that you have not already saved changes to without prompting you to save.”*

### Tips

At the end of each section there is a page for you to make notes on and a “Useful Information” heading where you will find tips and tricks relating to the topics described within the section.

# Section 1    Advanced worksheet Functions

## ► Objectives

By the end of this section you will be able to:

- Create and use **NAMES** in workbooks
- Understand and use conditional formulae
- Set up **LOOKUP** tables and use **LOOKUP** functions
- Use the **GOAL SEEK**
- Use the **SOLVER**

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## 1.1 Names

When entering formulae or referring to any area on the spreadsheet, it is usual to refer to a “range”. For example, B6 is a range reference; B6:B10 is also a range reference. A problem with this sort of reference is that it is not always easy to remember what cells to reference. It may be necessary to write down the range, or select it, which often means wasting time scrolling around the spreadsheet. Instead, Excel offers the chance to name ranges on the spreadsheet, and to use these names to select cells, refer to them in formulae or use them in Database, Chart or Macro commands.

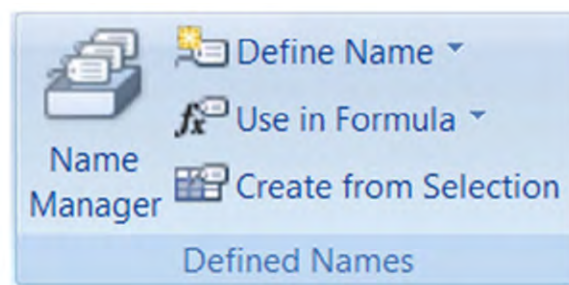
### Defining Names

There are a number of ways to set up names on a spreadsheet. A common way is to use the Insert, Name, Define menu. In the example, there is a range of sales figures that could be named “1st\_Qtr”;

	A	B	C	D	E
3		Australian Division			
4					
5		Name	1st Qtr	2nd Qtr	3rd Qtr
6		Long	110	175	140
7		Olson	200	210	240
8		Stark	300.9	180	395
9		Todd	150	200.4	125
10		Unger	220	195	335

Selection of cells for naming

**DEFINED NAMES**  
group on the  
**FORMULAS** ribbon



#### ➤ To name cells:

##### Mouse

- Select the cells you wish to name.
- Click the **DEFINE NAME** button on the in the **DEFINED NAMES GROUP** on the **FORMULAS** Ribbon
- The **NEW NAME** dialog box appears
- To name the cells, simply type a name in the **NAME** box and choose **OK**.

**New Name**

Name:

Scope:

Comment:

Refers to:

OK Cancel

**OR**

#### Keyboard

- Select the cells you wish to name.
- Type directly in the **NAME BOX** to the left of the **FORMULA BAR**.
- Press **RETURN**

_1st_Qtr      fx 110			
	A	B	C
3		Australian Division	
4			
5		Name	1st Qtr
6		Long	110
7		Olsen	200

*A range can include any selection of cells, not necessarily a contiguous row or column. Names can be up to 255 characters in length, must start with a letter and cannot include spaces. Names are not case sensitive.*

In the example, these cells would be called “**1st\_Qtr**”. From now on, any reference to the range C6:C10 can be made with the name “**1st\_Qtr**”; Notice that the name box, on the left-hand side of the formula bar now displays the name “**1st\_Qtr**”; It will do so whenever cells C6:C10 are selected;



### Creating Names Automatically

Alternatively, cells can be named using text already on the spreadsheet. For instance, in a spreadsheet, column or row headings may have already been entered in the cells. B6 to B10 for example shows the salesmen's names and their respective sales quarterly this text can be used to name the cell ranges for their sales

	A	B	C	D	E	F
3		Australian Division				
4						
5		Name	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
6		Long	110	175	140	750
7		Olson	200	210	240	575
8		Stark	300.9	180	395	1100
9		Todd	150	200.4	125	185
10		Unger	220	195	335	1025

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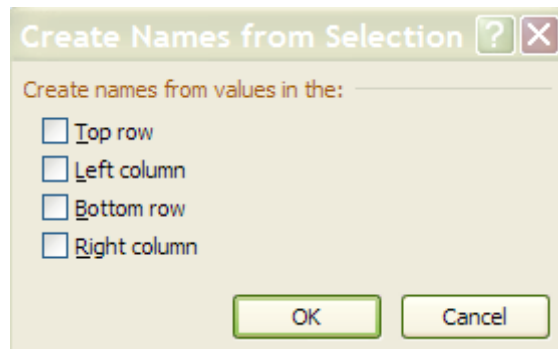
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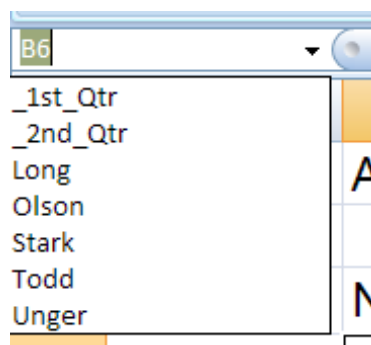
➤ To create names automatically:



### Mouse

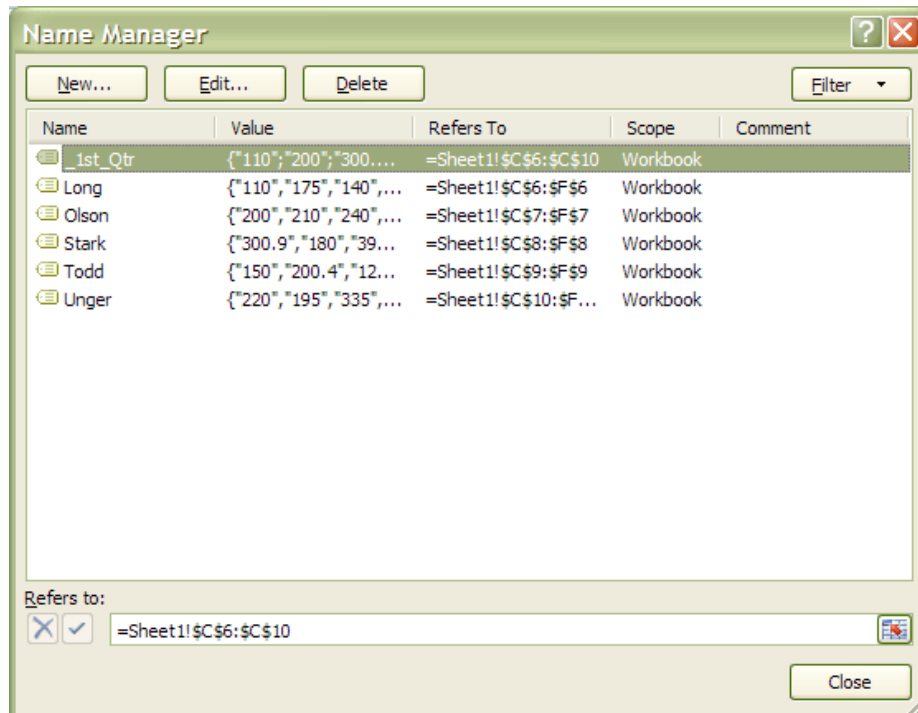
- Select the cells you wish to define names for, include the data and the data labels in either the first column or top row
- Click the **CREATE FROM SELECTION** button on the in the **DEFINED NAMES GROUP** on the **FORMULAS** Ribbon
- Select where your labels are. They **must be part of the selection** can be in the top row or left column.
- Choose **OK** and, all the salesmen's names will appear in the name box to the left of the formula bar and selecting their name will select their individual sales figures

*This procedure works equally well with text entered to the right of a row of data. Or labels in the bottom of a column but **THEY MUST BE PART OF THE SELECTION**.*



### Managing Names

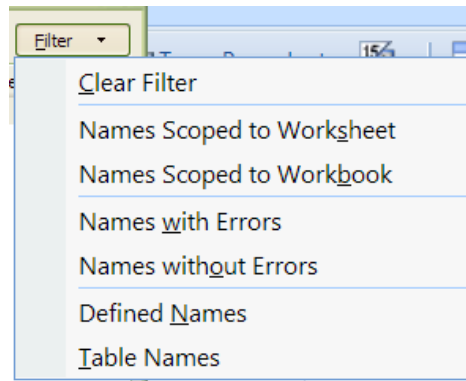
The **NAME MANAGER** option in the group is a useful tool that allows you to create, modify or delete names within your workbook even if the name refers to cells or ranges outside the present workbook.



➤ **To use name manager**

Mouse

- Click the **NAME MANAGER BUTTON** on the in the **DEFINED NAMES GROUP** on the **FORMULAS Ribbon**.
- The **NAME MANAGER** Dialog box appears.
- To create new name use the **NEW** button.
- The **NEW NAME** dialog appears. The name manager temporarily disappears until you click **OK** or **CANCEL**
- When the **NEW NAME** dialog box is there you must give a name, select a scope and click in the refers to box.
- You may then select any cells in this workbook or **ANY** open workbook.
- You may then click on **OK** the dialog box will close, the **NAME MANAGER** will reappear and the named cells will appear within the large white area.
- Selecting any named range will allow you to edit or delete it by clicking on the enabled buttons at the top of the dialog.



➤ **Filtering out needed named ranges**

Using the filter button allows some basic filtering of the names within your workbook.

*Don't forget to clear the filter after you have what you want. Scoping is a function where the names may be used on a specific sheet or throughout the whole workbook. When filtering the names you have it may be useful to set a scope if you have many names on many sheets.*

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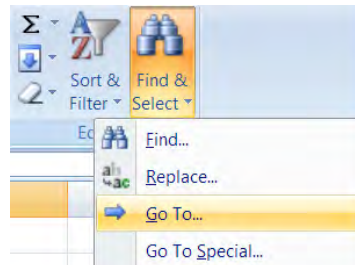
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## 1.2 Using Names

### Go To

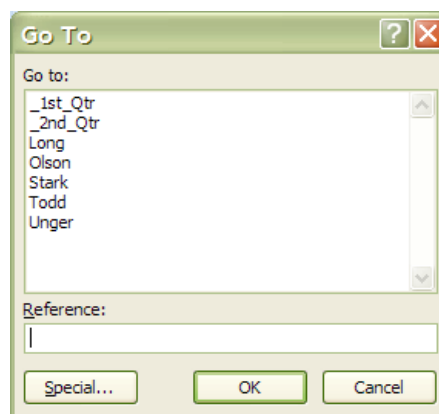
The GOTO feature can be used to go to a specific cell address on the spreadsheet. It can also be used in conjunction with names.



#### ➤ To GO TO a name:

##### Mouse

- Click the **FIND & SELECT BUTTON** on the in the **EDITING GROUP** on the **HOME** Ribbon.
- Select **GO TO**
- The following dialog appears
- Click on the name required, then choose **OK**.



##### Keyboard

- Press [**F5**]. The following dialog box appears;
- Click on the name required, then choose **OK**.

*Not only does the cell pointer move to the correct range, but it also selects it. This can be very useful for checking that ranges have been defined correctly, and also for listing all the names on the spreadsheet.*

*You can also go to a specific cell that has been used in two range names. The previous example mentioned cell C6, the intersection of the FEB and Britain ranges.*

- To move to a cell that belongs to two ranges:

#### Keyboard

- a) Press [F5] and type the first range name in the **Reference** box, then type a space and the second range name.
- b) Click **OK**. The pointer immediately jumps to the correct cell.



- To go to locations in workbook based on different criteria than names.

#### Keyboard

- a) Press [F5] and click the **SPECIAL** button. The following dialog appears.
- b) Make a selection and click on **OK**.
- c) All cells of those criteria will be selected.
- d) Use return or ribbon keys to move around.

### Names In Formulae

Names can be used in any simple formula, as well as any of Excel's built-in functions. Instead of typing cell references or selecting cells, simply type the name or paste the name into the formula.



=SUM(LONG)

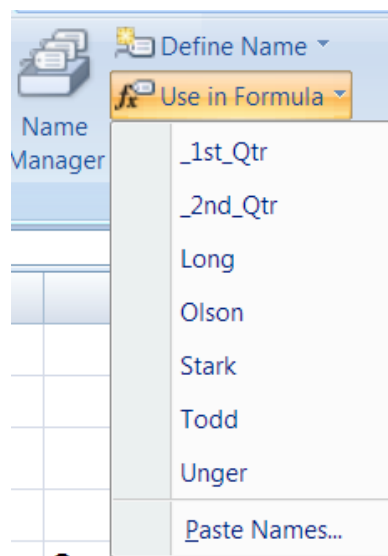
=AVERAGE(\_1ST\_QTR)

An intersecting name can be used, E.G.;

=LONG \_1ST\_QTR

= LONG \_1ST\_QTR + OLSON \_1ST\_QTR

To avoid typing a name, choose from a list and paste in the required name.



➤ To paste a name into a formula:

#### Mouse

- Click the **USE IN FORMULA BUTTON** on the in the **DEFINED NAMES** group on the **FORMULAS** Ribbon
- Select a name
- The name is entered within the selected cell prefaced by an equals sign

#### OR

- Click the **USE IN FORMULA BUTTON** on the in the **DEFINED NAMES** group on the **FORMULAS** Ribbon
- Click on the paste names option at the bottom of menu

- c) Click on the required name and choose **OK**

**OR**

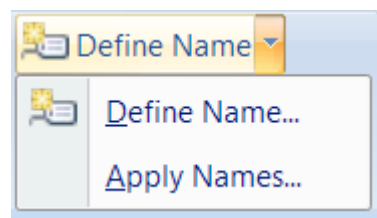
### Keyboard

Press [**F3**]

- a) Click on the required name and choose **OK**

### Applying Names

When a cell has already been referred to in a formula, and is then named, the name will not automatically appear in the formula. Similarly, if a cell is referred to by its address rather than its name, the name will not automatically appear. To replace all references with names, the names must be applied.



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Suppose a formula is written to sum cells C7:F7

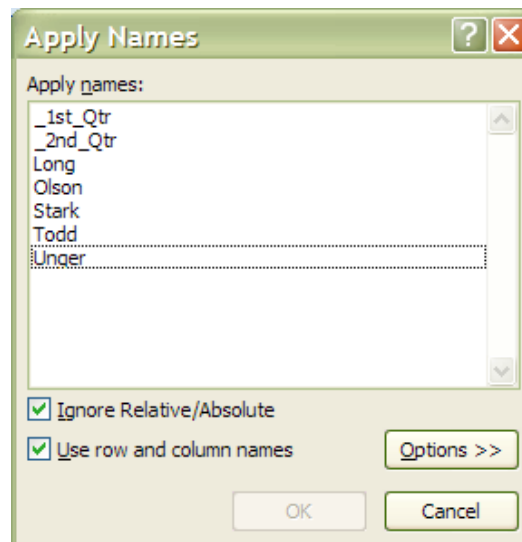
**=SUM(C7:F7)**

The formula makes no reference to the range “OLSON”, even though this range has been named.

➤ **To replace cell references with range names:**

Mouse

- Click the drop down arrow next to **DEFINE NAME BUTTON** on the in the **DEFINED NAMES** group on the **FORMULAS** Ribbon;
- Select **APPLY NAMES**.
- Click on the name you want, and choose **OK**.



*To apply other names at the same time, use [Ctrl] and click on the required names. The formula will now show the range names instead of the cell references.*

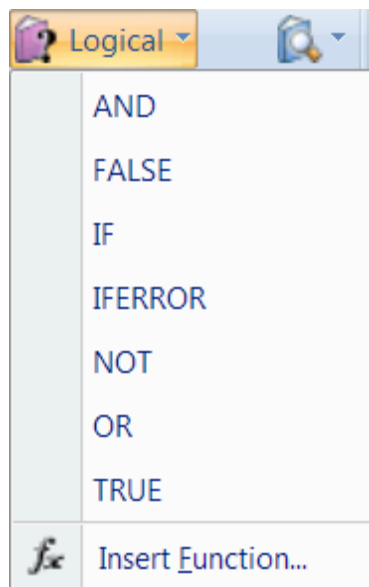
The Apply Names command works throughout the spreadsheet, so wherever the cell reference to the name you chose appeared, the name is now in its place.

### 1.3 Conditional & Logical Functions

Excel has a number of logical functions which allow you to set various “conditions” and have data respond to them. For example, you may only want a certain calculation performed or piece of text displayed if certain conditions are met. The functions used to produce this type of analysis are found in the Insert, Function menu, under the heading LOGICAL.

## If Statements

The IF function is used to analyse data, test whether or not it meets certain conditions and then act upon its decision. The formula can be entered either by typing it or by using the Function Library on the formula's ribbon, the section that deals with logical functions. Typically, the IF statement is accompanied by three arguments enclosed in one set of parentheses; the condition to be met (logical\_test); the action to be performed if that condition is true (value\_if\_true); the action to be performed if false (value\_if\_false). Each of these is separated by a comma, as shown;



**=IF ( logical\_test, value\_if\_true, value\_if\_false)**

➤ **To view IF function syntax:**

### Mouse

- Click the drop down arrow next to the **LOGICAL** button in the **FUNCTION LIBRARY** group on the **FORMULAS** Ribbon;
- A dialog box will appear
- The three arguments can be seen within the box

**Function Arguments**

**IF**

**Logical\_test**  = logical

**Value\_if\_true**  = any

**Value\_if\_false**  = any

=

Checks whether a condition is met, and returns one value if TRUE, and another value if FALSE.

**Logical\_test** is any value or expression that can be evaluated to TRUE or FALSE.

Formula result =

[Help on this function](#)

OK Cancel



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## Logical Test

This part of the IF statement is the “condition”, or test. You may want to test to see if a cell is a certain value, or to compare two cells. In these cases, symbols called LOGICAL OPERATORS are useful;

>	<b>Greater than</b>
<	<b>Less than</b>
> =	<b>Greater than or equal to</b>
< =	<b>Less than or equal to</b>
=	<b>Equal to</b>
< >	<b>Not equal to</b>

Therefore, a typical logical test might be B1 > B2, testing whether or not the value contained in cell B1 of the spreadsheet is greater than the value in cell B2. Names can also be included in the logical test, so if cells B1 and B2 were respectively named SALES and TARGET, the logical test would read SALES > TARGET. Another type of logical test could include text strings. If you want to check a cell to see if it contains text, that text string must be included in quotation marks. For example, cell C5 could be tested for the word YES as follows; C5="YES".

It should be noted that Excel's logic is, at times, brutally precise. In the above example, the logical test is that sales should be greater than target. If sales are equal to target, the IF statement will return the false value. To make the logical test more flexible, it would be advisable to use the operator > = to indicate “meeting or exceeding”.

## Value If True / False

Provided that you remember that TRUE value always precedes FALSE value, these two values can be almost anything. If desired, a simple number could be returned, a calculation performed, or even a piece of text entered. Also, the type of data entered can vary depending on whether it is a true or false result. You may want a calculation if the logical test is true, but a message displayed if false. (Remember that text to be included in functions should be enclosed in quotes).

Taking the same logical test mentioned above, if the sales figure meets or exceeds the target, a BONUS is calculated (e.g. 2% of sales). If not, no bonus is calculated so a value of zero is returned. The IF statement in column D of the example reads as follows;

D2      fx    =IF(B2>=C2,B2*2%,0)				
	A	B	C	D
1	Name	Sales	Target	Bonus
2	Bill	580	640	0
3	Karen	1200	1000	24
4	Ted	710	700	14.2
5				

=IF(B2>=C2,B2\*2%,0)



You may, alternatively, want to see a message saying “NO BONUS”. In this case, the true value will remain the same and the false value will be the text string “NO BONUS”;

**=IF(B2>=C2,B2\*2%,"NO BONUS")**

A particularly common use of IF statements is to produce “ratings” or “comments” on figures in a spreadsheet. For this, both the true and false values are text strings. For example, if a sales figure exceeds a certain amount, a rating of “GOOD” is returned, otherwise the rating is “POOR”;

**=IF(B2>1000,"GOOD","POOR")**

D2		fx =IF(B2>1000,"good","poor")		
	A	B	C	D
1	Name	Sales	Target	Bonus
2	Bill	580	640	poor
3	Karen	1200	1000	good
4	Ted	710	700	poor

### Nested If

When you need to have more than one condition and more than two possible outcomes, a NESTED IF is required. This is based on the same principle as a normal IF statement, but involves “nesting” a secondary formula inside the main one. The secondary IF forms the FALSE part of the main statement, as follows;

**=IF(1st logic test , 1st true value , IF(2nd logic test , 2nd true value , false value))**

Only if both logic tests are found to be false will the false value be returned. Notice that there are two sets of parentheses, as there are two separate IF statements. This process can be enlarged to include more conditions and more eventualities - up to seven IF's can be nested within the main statement. However, care must be taken to ensure that the correct number of parentheses are added.

In the example, sales staff could now receive one of three possible ratings;

**=IF(B2>1000,"GOOD",IF(B2<600,"POOR","AVERAGE"))**

To make the above IF statement more flexible, the logical tests could be amended to measure sales against cell references instead of figures. In the example, column E has been used to hold the upper and lower sales thresholds.

**=IF(B2>=E\$2,"GOOD",IF(B2<=E\$3,"POOR","AVERAGE"))**

(If the IF statement is to be copied later, this cell reference should be absolute).

D2		fx =IF(B2>\$E\$2,"GOOD",IF(B2<\$E\$3,"POOR","AVERAGE"))				
	A	B	C	D	E	F
1	Name	Sales	Target	Bonus	Thresholds	
2	Bill	580	640	POOR	1000	
3	Karen	1200	1000	GOOD	600	
4	Ted	710	700	AVERAGE		
5						

*N.B. The depth of nested IF functions has been increased to 64 as previous versions of excel only nested 7 deep*

### Statistical If Statements

A very useful technique is to display text or perform calculations only if a cell is the maximum or minimum of a range. In this case the logical test will contain a nested statistical function (such as MAX or MIN). If, for example, a person's sales cell is the maximum in the sales column, a message stating "Top Performer" could appear next to his or her name. If the logical test is false, a blank message could appear by simply including an empty set of quotation marks. When typing the logical test, it should be understood that there are two types of cell referencing going on. The first is a reference to one person's figure, and is therefore relative. The second reference represents the RANGE of everyone's figures, and should therefore be absolute.

**=IF(relative cell = MAX(absolute range) , "Top Performer" , "")**

B3		fx =IF(C3=MAX(\$C\$2:\$C\$4),"Top Performer","")			
	A	B	C	D	E
1	Name	Message	sales		
2	Bill		580		
3	Karen	Top Performer	1200		
4	Ted		710		
5					

In this example the IF statement for cell B2 will read;

**=IF(C2=MAX(\$C\$2:\$C\$4),"Top Performer","")**

When this is filled down through cells B3 and B4, the first reference to the individual's sales figure changes, but the reference to all three sales figures (\$C\$2:\$C\$4) should remain constant. By doing this, you ensure that the IF statement is always checking to see if the individual's figure is the biggest out of the three.

A further possibility is to nest another IF statement to display a message if a value is the minimum of a range. Beware of syntax here - the formula could become quite unwieldy!

## 1.4 AND, OR, NOT

Rather than create large and unwieldy formulae involving multiple IF statements, the AND, OR and NOT functions can be used to group logical tests or “conditions” together. These three functions can be used on their own, but in that case they will only return the values “TRUE” or “FALSE”. As these two values are not particularly meaningful on a spreadsheet, it is much more useful to combine the AND, OR and NOT functions within an IF statement. This way, you can ask for calculations to be performed or other text messages to appear as a result.

### And

This function is a logical test to see if all conditions are true. If this is the case, the value “TRUE” is returned. If any of the arguments in the AND statement are found to be false, the whole statement produces the value “FALSE”. This function is particularly useful as a check to make sure that all conditions you set are met.

Arguments are entered in the AND statement in parentheses, separated by commas, and there is a maximum of 30 arguments to one AND statement. The following example checks that two cells, B1 and B2, are both greater than 100.

**=AND(B1>100,B2>100)**



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If either one of these two cells contains a value less than a hundred, the result of the AND statement is "FALSE." This can now be wrapped inside an IF function to produce a more meaningful result. You may want to add the two figures together if they are over 100, or display a message indicating that they are not high enough.

B3		fx =IF(AND(B1>100,B2>100),B1+B2,"Figures not high enough")					
	A	B	C	D	E	F	
1		120					
2		30					
3		Figures not high enough					
4							

**=IF(AND(B1>100,B2>100),B1+B2,"Figures not high enough")**

Another application of AND's is to check that a number is between certain limits. The following example checks that a number is between 50 and 100. If it is, the value is entered. If not, a message is displayed;

**=IF(AND(B1>50,B1<100),B1,"Number is out of range")**

Or

This function is a logical test to see if one or more conditions are true. If this is the case, the value "TRUE" is returned. If just one of the arguments in the OR statement is found to be true, the whole statement produces the value "TRUE". Only when all arguments are false will the value "FALSE" be returned. This function is particularly useful as a check to make sure that at least one of the conditions you set is met.

**=IF(OR(B1>100,B2>100),"at least one is OK","Figures not high enough")**

In the above formula, only one of the numbers in cells B1 and B2 has to be over 100 in order for them to be added together. The message only appears if neither figure is high enough.

B3		fx =IF(OR(B1>100,B2>100),B1+B2,"Figures not high enough")					
	A	B	C	D	E	F	
1		120					
2		30					
3		150					
4							

## Not

NOT checks to see if the argument is false. If so, the value "TRUE" is returned. It is best to use NOT as a "provided this is not the case" function. In other words, so long as the argument is false, the overall statement is true. In the example, the cell contents of B1 are returned unless the number 13 is encountered. If B1 is found to contain 13, the message "Unlucky!" is displayed;

**=IF(NOT(B1=13),B1,"Unlucky!")**

The NOT function can only contain one argument. If it is necessary to check that more than one argument is false, the OR function should be used and the true and false values of the IF statement reversed. Suppose, for example, a check is done against the numbers 13 and 666;

**=IF(OR(B1=13,B1=666),"Unlucky!",B1)**

	B3		=IF(OR(B1=13,B1=666),"Unlucky!",B1)			
	A	B	C	D	E	F
1		13				
2		99				
3		Unlucky!				
4						

## 1.5 Lookup Functions

As already mentioned, Excel can produce varying results in a cell, depending on conditions set by you. For example, if numbers are above or below certain limits, different calculations will be performed and text messages displayed. The usual method for constructing this sort of analysis is using the IF function. However, as already demonstrated, this can become large and unwieldy when you want multiple conditions and many possible outcomes. To begin with, Excel can only nest seven IF clauses in a main IF statement, whereas you may want more than eight logical tests or "scenarios." To achieve this, Excel provides some LOOKUP functions. These functions allow you to create formulae which examine large amounts of data and find information which matches or approximates to certain conditions. They are simpler to construct than nested IF's and can produce many more varied results.

### Lookup

Before you actually start to use the various LOOKUP functions, it is worth learning the terms that you will come across, what they mean and the syntax of the function arguments.

## Vector Lookup

A vector is a series of data that only occupies one row or column. LOOKUP will look through this row or column to find a specific value. When the value is found, a corresponding “result” in the adjacent row or column is returned. For example, column D of a spreadsheet may contain figures, and the adjacent column E contains corresponding text. LOOKUP will search for the requested figure in column D and return the corresponding text from column E.

The syntax for LOOKUP is as follows;

**=LOOKUP( lookup\_value , lookup\_vector , result\_vector )**

The lookup\_value represents the number or text entry to look for; the lookup\_vector is the area in which to search for the lookup\_value; the result\_vector is the adjacent row or column where the corresponding value or text is to be found.

***It is essential that data in the lookup vector is placed in ascending order, i.e. numbers from lowest to highest, text from A to Z. If this is not done, the LOOKUP function may return the wrong result.***

B14		=LOOKUP(B13,D3:D11,E3:E11)				
	A	B	C	D	E	F
1						
2	What Car ?				Car	
3				£10,000	Reliant	
4				£15,000	Metro	
5			Salary	£20,000	Golf	
6				£25,000	Sierra	
7				£30,000	Sapphire	
8				£33,000	Granada	
9				£35,000	Scorpio	
10				£40,000	Mercedes	
11				£50,000	Jaguar	
12						
13	Salary	40000				
14	Car	Mercedes				
15						

In the diagram, column D contains varying salaries, against which there is a company car in column E which corresponds to each salary. For example, a £20030 salary gets a Golf, a £35000 salary gets a Scorpio. A LOOKUP formula can be used to return whatever car is appropriate to a salary figure that is entered. In this case, the lookup\_value is the cell where the salary is entered (B13), the lookup\_vector is the salary column (D3:D11), and the result\_vector is the car column (E3:E11). Hence the formula;

**=LOOKUP(B13,D3:D11,E3:E11)**

Typing 40000 in cell B13 will set the lookup\_value. LOOKUP will search through the lookup\_vector to find the matching salary, and return the appropriate car from the result\_vector, which in this case is Mercedes.



Alternatively, the formula could be simplified and cell references avoided by using Formula, Define Name to give appropriate range names. Call B13 Salary, D3:D11 Salaries and E3:E11 Cars. The LOOKUP formula could then be simplified to;

**=LOOKUP(Salary,Salaries,Cars)**

One of the advantages of the LOOKUP function is that if the exact lookup\_value is not found, it will approximate to the nearest figure below the requested value. For instance, if a user enters a Salary of 23000, there is no figure in the Salaries range which matches this. However, the nearest salary below 23000 is 20030, so the corresponding car is returned, which is a Golf. This technique is very useful when the lookup\_vector indicates grades or “bands.” In this case, anyone in the salary “band” between 20030 and 25000 gets a Golf. Only when their salary meets or exceeds 25000 do they get a Sierra.

Typical layout of a sheet needing a LOOKUP function

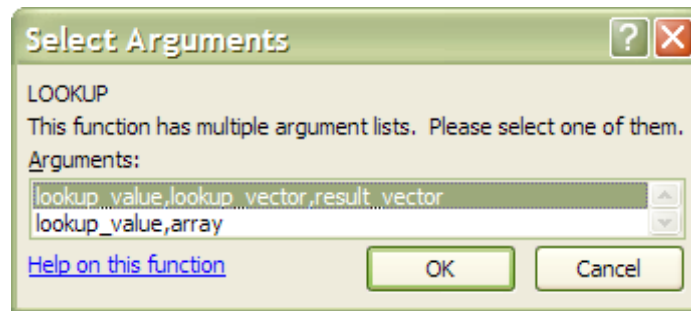
Location of all REFERENCE and LOOKUP functions

	A	B	C	D	Formula B
1					
2	What car ?				Car
3				£ 10,000	Reliant
4				£ 15,000	Metro
5			Salary	£ 20,000	Golf
6				£ 25,000	Sierra
7				£ 30,000	Sapphire
8				£ 35,000	Granada
9				£ 40,000	Scorpio
10				£ 45,000	Mercedes
11				£ 50,000	jaguar
12					
13	Salary	£23,000			
14	car	Golf			

ADDRESS  
AREAS  
CHOOSE  
COLUMN  
COLUMNS  
GETPIVOTDATA  
HLOOKUP  
HYPERLINK  
INDEX  
INDIRECT  
LOOKUP  
MATCH  
OFFSET  
ROW  
Insert Function...

There may be occasions where the lookup\_value is below the lowest value in the vector. In this case the #N/A message is displayed.

➤ **To insert a lookup function:**

Mouse

- a) Click the drop down arrow next to the **LOOKUP AND REFERENCE** button in the **FUNCTION LIBRARY** group on the **FORMULAS** Ribbon;
- b) A dialog box appears displaying the two versions of LOOKUP. There are two syntax forms; the first is the “array” and the second the “vector.”

*The second of these forms, the “vector” LOOKUP is by far the most useful, and it is recommended that you only use this form.*

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## Hlookup

The horizontal LOOKUP function (HLOOKUP) can be used not just on a “vector” (single column or row of data), but on an “array” (multiple rows and columns). HLOOKUP searches for a specified value horizontally along the top row of an array. When the value is found, HLOOKUP searches down to a specified row and enters the value of the cell. This is useful when data is arranged in a large tabular format, and it would be difficult for you to read across columns and then down to the appropriate cell. HLOOKUP will do this automatically.

The syntax for HLOOKUP is;

**=HLOOKUP( lookup\_value , table\_array , row\_index\_number)**

The lookup\_value is, as before, a number, text string or cell reference which is the value to be found along the top row of the data; the table\_array is the cell references (or range name) of the entire table of data; the row\_index\_number represents the row from which the result is required. This must be a number, e.g. 4 instructs HLOOKUP to extract a value from row 4 of the table\_array.

It is important to remember that data in the array must be in ascending order. With a simple LOOKUP function, only one column or row of data, referred to as a vector, is required. HLOOKUP uses an array (i.e. more than one column or row of data). Therefore, as HLOOKUP searches horizontally (i.e. across the array), data in the first row must be in ascending order, i.e. numbers from lowest to highest, text from A to Z. As with LOOKUP, if this rule is ignored, HLOOKUP will return the wrong value.

As an example, a user may have a spreadsheet which displays various different rates of interest for a range of amounts over different time periods;

Whatever the amount a customer wants to borrow, he may pay up to five different rates of interest depending on whether the loan is over 10, 15 or more years. The HLOOKUP function will find a specific amount, then move down the array to find the appropriate interest rate for the required time period.

B51		fx		=HLOOKUP(A51,C43:H48,3)				
	A	B	C	D	E	F	G	H
40								
41								
42	Loan Rates							
43			Amount					
44			£ 20,000.00	£ 25,000.00	£ 30,000.00	£ 40,000.00	£ 60,000.00	
45		Period	10	12.50%	14.10%	14.90%	15.50%	16.30%
46			15	14.00%	14.30%	15.00%	16.00%	17.50%
47			20	16.50%	17.00%	17.00%	17.60%	19.00%
48			25	17.20%	17.50%	18.00%	18.50%	19.30%
49			30	17.90%	18.00%	18.60%	19.00%	20.20%
50	amount	rate						
51	30000	15.00%						
52								

Designate cell A51 as the cell to hold the amount, i.e. the `lookup_value`; cells C43:H48 are the `table_array`; the `row_index_number` will be 2 if a customer wants the loan over 10 years, 3 if he wants the loan over 15 years, and so on. Cell B51 holds this formula;

**=HLOOKUP(A51,C43:H48,3)**

The above formula looks along the top row of the array for the value in cell A51 (30000). It then moves down to row 3 and returns the value 15.00%, which is the correct interest rate for a £30000 loan over 15 years. (Range names could be used here to simplify the formula).

As with the LOOKUP function, the advantage of HLOOKUP is that it does not necessarily have to find the exact `lookup_value`. If, for example, you wanted to find out what interest rate is applicable to a £28000 loan, the figure 28000 can be entered in the `lookup_value` cell (A51) and the rate 14.30% appears. As before, Excel has looked for the value in the array closest to, but lower than, the `lookup_value`.

## Vlookup

The VLOOKUP function works on the same principle as HLOOKUP, but instead of searching horizontally, VLOOKUP searches vertically. VLOOKUP searches for a specified value vertically down the first column of an array. When the value is found, VLOOKUP searches across to a specified column and enters the value of the cell. The syntax for the VLOOKUP function follows the same pattern as HLOOKUP, except that instead of specifying a row index number, you would specify a column index number to instruct VLOOKUP to move across to a specific column in the array where the required value is to be found.

**=VLOOKUP(lookup\_value , table\_array , col\_index\_number )**

In the case of VLOOKUP, data in the first column of the array should be in ascending order, as VLOOKUP searches down this column for the lookup\_value.

In the same spreadsheet as before, a VLOOKUP formula could be used to search for a specific time period, then return the appropriate rate for a fixed amount. In the following example, a time period is entered in cell A54 and in B54 the VLOOKUP formula is contained;

B54		fx		=VLOOKUP(A54,C43:H48,5)				
	A	B	C	D	E	F	G	H
40								
41								
42	<b>Loan Rates</b>							
43			<i>Amount</i>					
44				£ 20,000.00	£ 25,000.00	£ 30,000.00	£ 40,000.00	£ 60,000.00
45		<i>Period</i>	10	12.50%	14.10%	14.90%	15.50%	16.30%
46			15	14.00%	14.30%	15.00%	16.00%	17.50%
47			20	16.50%	17.00%	17.00%	17.60%	19.00%
48			25	17.20%	17.50%	18.00%	18.50%	19.30%
49			30	17.90%	18.00%	18.60%	19.00%	20.20%
50	<i>amount</i>	<i>rate</i>						
51	30000	15.00%						
52								
53	<i>period</i>	<i>rate</i>						
54	17	16.00%						

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Cell B54 holds this formula;

**=VLOOKUP(A54,C43:H48,5)**

The cell A54 is the lookup\_value (time period), the table\_array is as before, and for this example rates are looked up for a loan of £40000, hence the column\_index\_number 5. By changing the value of cell A54, the appropriate rate for that time period is returned. Where the specific lookup\_value is not found, VLOOKUP works in the same way as HLOOKUP. In other words, the nearest value in the array that is less than the lookup\_value will be returned. So, a £40000 loan over 17 years would return an interest rate of 16.00%.

### Nested Lookups

One of the limitations of the horizontal and vertical LOOKUP functions is that for every lookup\_value changed, the column or row index number stays constant. Using our example, the HLOOKUP will search for any amount, but always for the same time period. Conversely, the VLOOKUP will search for any time period, but always for the same amount. In both cases, if you want to alter the time period and the amount the formula must be edited to alter the column or row index number.

There is, however, a technique whereby one LOOKUP function is “nested” within another. This looks up one value, which will then be used in a second LOOKUP formula as a column or row index number. Using this technique allows you to, say, enter a time period and an amount and see the correct interest rate.

Because nested LOOKUPS have more than one lookup\_value, more than one array is needed. This second array should consist of the column or row numbers to be used in the LOOKUP formula. The example shows our main interest rates spreadsheet, with an additional two columns of data;

J52		fx		=HLOOKUP(J50,C43:H48,LOOKUP(K50,J43:J47,K43:K47))					
	C	D	E	F	G	H	I	J	K
40									
41									
42		Amount							
43		£ 20,000.00	£ 25,000.00	£ 30,000.00	£ 40,000.00	£ 60,000.00		10	2
44	10	12.50%	14.10%	14.90%	15.50%	16.30%		15	3
45	15	14.00%	14.30%	15.00%	16.00%	17.50%		20	4
46	20	16.50%	17.00%	17.00%	17.60%	19.00%		25	5
47	25	17.20%	17.50%	18.00%	18.50%	19.30%		30	6
48	30	17.90%	18.00%	18.60%	19.00%	20.20%			
49								Amount	period
50								40000	25
51									
52								18.50%	

Column J contains all the same time periods as column C, but alongside this are numbers 2 to 6, indicating the row\_index\_number to be returned for the appropriate time period. To look up this value, use a simple vector LOOKUP formula, where K50 is the required time period, J43:J47 is the lookup\_vector and K43:K47 is the result\_vector;

**LOOKUP(K50,J43:J47,K43:K47)**

Notice there is no equals sign, because this formula is not being entered in a cell of its own. The formula will return a value between 2 and 6 which will be used as a row\_index\_number in a HLOOKUP formula. This HLOOKUP will look in the main interest rate table for an amount typed in by you, and will respond to the row\_index\_number returned from the nested LOOKUP formula. The cells J50 and K50 hold the amount and time period to be typed in by you, and the entire nested HLOOKUP, typed in J52, is as follows;

**=HLOOKUP(J50,C43:H48,LOOKUP(K50,J43:J47,K43:K47))**

In the example, the time period 25 is vertically looked up in column J and the corresponding value 5 is returned. Also, the amount 40000 is horizontally looked up in the main table, with a row\_index\_number of 5. The end result is an interest rate of 18.50%. Simply by changing cells J50 and K50, the correct interest rate is always returned for the amount and period typed in.

## 1.6 Other Useful Functions

### ISERROR

**ISERROR** is a very useful function that tells you if the formula you look at with it gives any error value.

**Iserror(Value)**

Value refers to any error value (#N/A, #VALUE!, #REF!, #DIV/0!, #NUM!, #NAME?, or #NULL!)

#### ➤ To use ISERROR function

In the example below the average functions in the column G is trying to divide empty cells and giving the error message #DIV/0! The error function checking that cell gives the value true there is an error this could be nested in an IF function with an **AVERAGE** function so that the error message does not show in column G

	A	B	C	D	E	F	G	H
1								
2					Bonus	75		
3								
4			Jan	Feb	Mar	Total	Average	error?
5		Bob				0.00	#DIV/0!	TRUE
6		John				0.00	#DIV/0!	TRUE
7		George	53.5	67	77.6	198.10	66.03	FALSE

### Mouse

- Click on **MORE FUNCTIONS** in the **FORMULAS** group on the **FORMULAS** ribbon
- Select **ISERROR** function
- The dialog box above will appear
- Select cell you wish to check, the cell reference will appear in the **VALUE** box.
- Click **OK**

**Function Arguments**

**ISERROR**

Value:  = #DIV/0!

= TRUE

Checks whether a value is an error (#N/A, #VALUE!, #REF!, #DIV/0!, #NUM!, #NAME?, or #NULL!), and returns TRUE or FALSE.

**Value** is the value you want to test. Value can refer to a cell, a formula, or a name that refers to a cell, formula, or value.

Formula result = TRUE

[Help on this function](#)

OK Cancel

For more advanced users try nesting the ISERROR function and the function giving an error message in an **IF** function.

	A	B	C	D	E	F	G	H
4			Jan	Feb	Mar	Total	Average	
5		Bob				0.00	nothing to divide	
6		John				0.00	nothing to divide	
7		George	53.5	67	77.6	198.10	#DIV/0!	

### IFERROR

**IFERROR(Value, value\_if\_error)**

A common request in the area of functions is something to simplify error checking.



E.G. If a user wants to catch errors in a **VLOOKUP** and use their own error text opposed to Excel's error, they have to do something like this using the **IF** and **ISERROR** functions:

```
=IF(ISERROR(VLOOKUP("Dave", SalesTable, 3, FALSE)), " Value not found", VLOOKUP("Dave", SalesTable, 3, FALSE))
```

As you can see, users need to repeat the **VLOOKUP** formula twice. This has a number of problems.

**FIRST**, it is hard to read and hard to maintain – if you want to change a formula, you have to do it twice.

**SECOND**, it can affect performance, because formulas are quite often run twice. The **IFERROR** function solves these problems, enabling customers to easily trap and handle formula errors.

Here is an example of how a user could use it in the same situation:

```
=IFERROR(VLOOKUP("Bob", SalesTable, 3, false), "Value not found")
```

It's only an opportunity if you act on it

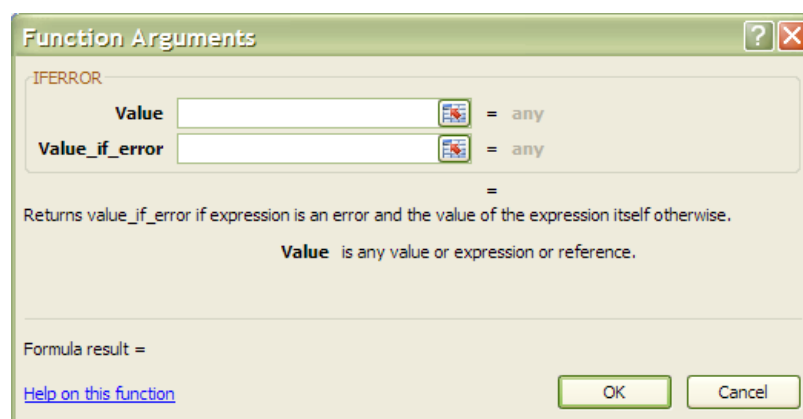
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➤ **To use IFERROR function**

Mouse

- Click on **LOGICAL** in the **FORMULAS** group on the **FORMULAS** ribbon
- Select **IFERROR** function
- The dialog box above will appear
- Click in the **VALUE** text box.
- Select cell you wish to check, the cell reference will appear in the **VALUE** box.
- Type in the **VALUE\_IF\_ERROR** text box what value you wish to display if an error is found
- Click **OK**



## COUNTIF

**COUNTIF** counts the number of cells in a range based on agiven criteria.

**COUNTIF(range,criteria)**

**RANGE** is one or more cells to count, including numbers or names, arrays, or references that contain numbers. Blank and text values are ignored.

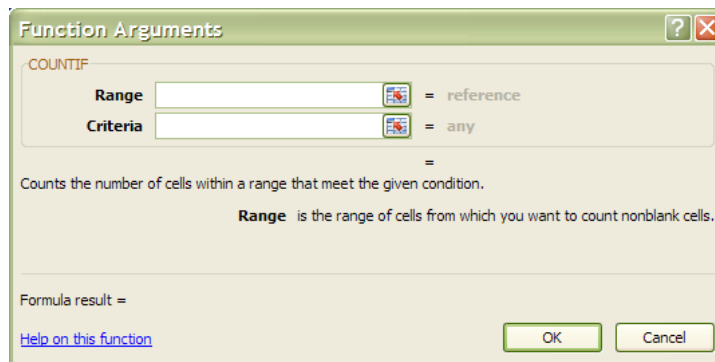
**CRITERIA** is the criteria in the form of a number, expression, cell reference, or text that defines which cells will be counted. For example, criteria can be expressed as 32, "32", ">32", "apples", or B4.

➤ **To use COUNTIF function**

Mouse

- Click on the **MORE FUNCTIONS** button in the **FORMULAS** group on the **FORMULAS** ribbon
- Click on **STATISTICAL**.

- c) Select **COUNTIF** from the displayed functions. A dialog will be displayed



- d) Click in **RANGE** text box  
 e) Select the range of cells you wish to check.  
 f) Click in the **CRITERIA** box, either, type criteria directly in the box or select a cell that contains the value you wish to count.  
 g) Click **OK**

A9		fx =COUNTIF(A2:A5,"apples")			
	A	B	C	D	E
1	Data	Data			
2	apples	32			
3	oranges	54			
4	peaches	75			
5	apples	86			
6					
7					
8	Formula	Description (result)	formula		
9	2	Number of cells with apples in the first column above (2)	COUNTIF(A2:A5,"apples")		
10	1	Number of cells with peaches in the first column above (1)	COUNTIF(A2:A5,A4)		

## AVERAGEIF

A very common request is for a single function to conditionally average a range of numbers – a complement to **SUMIF** and **COUNTIF**. **AVERAGEIF**, allows users to easily average a range based on a specific criteria.

**AVERAGEIF(Range, Criteria, [Average Range])**

**RANGE** is one or more cells to average, including numbers or names, arrays, or references that contain numbers.

**CRITERIA** is the criteria in the form of a number, expression, cell reference, or text that defines which cells are averaged. For example, criteria can be expressed as 32, "32", ">32", "apples", or B4.

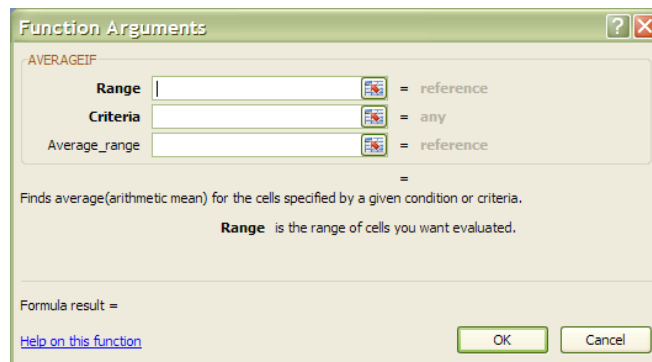
**AVERAGE\_range** is the actual set of cells to average. If omitted, **RANGE** is used.

Here is an example that returns the average of **B2:B5** where the corresponding value in column A is greater than **250,000**:

**=AVERAGEIF(A2:A5, ">250000", B2:B5)**

➤ **To use AVERAGEIF function**

Mouse



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- h) Click on the **MORE FUNCTIONS** button in the **FORMULAS** group on the **FORMULAS** ribbon and Click on **STATISTICAL**.
- i) Select **AVERAGEIF** from the displayed functions. A dialog will be displayed
- j) Click in **RANGE** text box
- k) Select the range of cells containing the .values you wish checked against the criteria.
- l) Click in the **CRITERIA** box, either, type criteria directly in the box or select a cell that contains the value you wish to check the range against
- m) Click in the **AVERAGE\_RANGE** text box and select the range you wish to average..
- n) Click **OK**

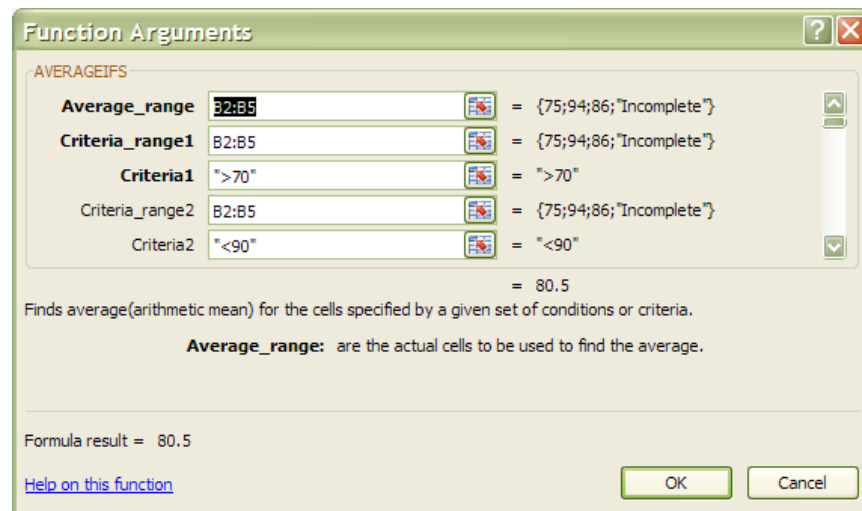
### AVERAGEIFS

Average ifs is a new function to excel and does much the same as the **AVERAGEIF** function but it will average a range using multiple criteria.

A7		fx		=AVERAGEIFS(B2:B5,B2:B5,">70",B2:B5,"<90")	
	A	B	C	D	E
1	Student	First Quiz Grade	Second Quiz Grade	Final Exam Grade	
2	Emilio	75	85	87	
3	Julie	94	80	88	
4	Hans	86	93	Incomplete	
5	Frederique	Incomplete	75	75	
6	Formula	Description (result)			Formula
7	80.5	Averages for all students all first quiz grades that are between 70 and 90 (80.5)			AVERAGEIFS(B2:B5,B2:B5,">70",B2:B5,"<90")
8	#DIV/0!	Averages for all students all second quiz grades that are greater than 95, but none exist (#DIV/0!)			AVERAGEIFS(C2:C5,C2:C5,">95")

➤ To use AVERAGEIFS function

Mouse



- o) Click on the **MORE FUNCTIONS** button in the **FORMULAS** group on the **FORMULAS** ribbon and Click on **STATISTICAL**.
- p) Select **AVERAGEIFS** from the displayed functions. A dialog will be displayed
- q) Click in **AVERAGE\_RANGE** text box
- r) Select the range of cells containing the values you wish checked against the criteria.
- s) Click in the **CRITERIA\_RANGE1** box select a range of cells that contains the values you wish to check the criteria against
- t) Click in the **CRITERIA1** text box and type in the criteria to measure against your **CRITERIA\_RANGE1**.
- u) Repeat steps 5 and 6 to enter multiple criteria, range2, range3 etc, use the scroll bar on the right to scroll down and locate more range and criteria text boxes. Click **OK** when all ranges and criterias have been entered.

Some important points about **AVERAGEIFS FUNCTION**

- If **AVERAGE\_RANGE** is a blank or text value, **AVERAGEIFS** returns the **#DIV0!** error value.
- If a cell in a criteria range is empty, **AVERAGEIFS** treats it as a 0 value.
- Cells in range that contain **TRUE** evaluate as 1; cells in range that contain **FALSE** evaluate as 0 (zero).
- Each cell in **AVERAGE\_RANGE** is used in the average calculation only if all of the corresponding criteria specified are true for that cell.
- Unlike the range and criteria arguments in the **AVERAGEIF** function, in **AVERAGEIFS** each **CRITERIA\_RANGE** must be the same size and shape as **SUM\_RANGE**.
- If cells in **AVERAGE\_RANGE** cannot be translated into numbers, **AVERAGEIFS** returns the **#DIV0!** error value.

- If there are no cells that meet all the criteria, **AVERAGEIFS** returns the **#DIV/0!** error value.
- You can use the wildcard characters, question mark (?) and asterisk (\*), in criteria. A question mark matches any single character; an asterisk matches any sequence of characters. If you want to find an actual question mark or asterisk, type a tilde (~) before the character.

## SUMIFS

This function adds all the cells in a range that meets multiple criteria.

The order of arguments is different between **SUMIFS** and **SUMIF**. In particular, the **SUM\_RANGE** argument is the first argument in **SUMIFS**, but it is the third argument in **SUMIF**. If you are copying and editing these similar functions, make sure you put the arguments in the correct order.

**SUMIFS(sum\_range,criteria\_range1,criteria1,criteria\_range2,criteria2...)**

**SUM\_RANGE** is one or more cells to sum, including numbers or names, arrays, or references that contain numbers. Blank and text values are ignored.

**CRITERIA\_RANGE1, CRITERIA\_RANGE2,** are 1 to 127 ranges in which to evaluate the associated criteria.

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**CRITERIA1, CRITERIA2, ...** are 1 to 127 criteria in the form of a number, expression, cell reference, or text that define which cells will be added. For example, criteria can be expressed as 32, "32", ">32", "apples", or B4.

Some important points about **SUMIFS**

Each cell in **SUM\_RANGE** is summed only if all of the corresponding criteria specified are true for that cell.

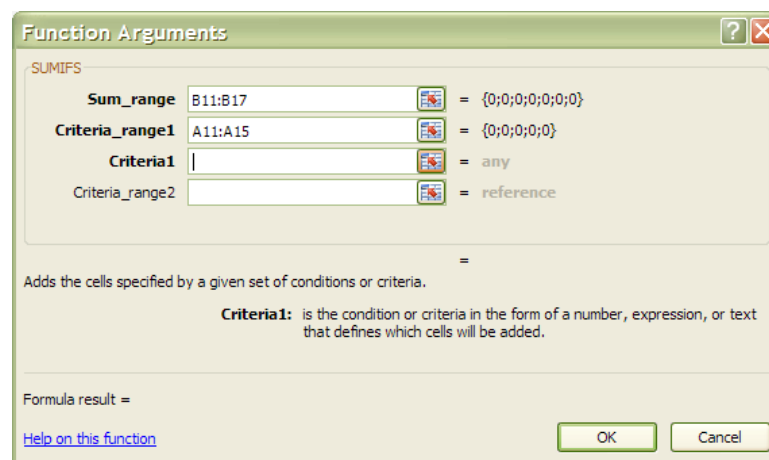
Cells in **SUM\_RANGE** that contain **TRUE** evaluate as 1; cells in **SUM\_RANGE** that contain **FALSE** evaluate as 0 (zero).

Unlike the range and criteria arguments in the **SUMIF** function, in **SUMIFS** each **CRITERIA\_RANGE** must be the same size and shape as **SUM\_RANGE**.

You can use the wildcard characters, question mark (?) and asterisk (\*), in criteria. A question mark matches any single character; an asterisk matches any sequence of characters. If you want to find an actual question mark or asterisk, type a tilde (~) before the character.

#### ➤ To use SUMIFS function

##### Mouse



- v) Click on the **MATH & TRIG** button in the **FORMULAS** group on the **FORMULAS** ribbon.
- w) Select **SUMIFS** from the displayed functions. A dialog will be displayed
- x) Click in **SUM\_RANGE** text box
- y) Select the range of cells containing the values you wish to sum up
- z) Click in the **CRITERIA\_RANGE1** box select a range of cells that contains the values you wish to check the criteria against
- aa) Click in the **CRITERIA1** text box and type in the criteria to measure against your **CRITERIA\_RANGE1**.



ab) Repeat steps 5 and 6 to enter multiple criteria, range2, range3 etc, as you use each **CRITERIA\_RANGE** and **CRITERIA** more text boxes will appear for you to use. Click **OK** when all ranges and criterias have been entered.

A7		=SUMIFS(B2:E2,B3:E3,">3%",B4:E4,">=2%")									
	A	B	C	D	E	F	G	H	I	J	K
1	Totals	Account 1	Account 2	Account 3	Account 4						
2	Amount in dollars	100	390	8321	500						
3	Interest paid (2000)	1%	0.50%	3%	4%						
4	Interest paid (2001)	1%	1.30%	2.10%	2%						
5	Interest paid (2002)	0.50%	3%	1%	4%						
6	Formula	Description (result)				Formulas					
7	500	Total amounts from each bank account where the interest was greater than 3% for the year 2000 and greater than or equal to 2% for the year 2001 (500)				SUMIFS(B2:E2,B3:E3,">3%",B4:E4,">=2%")					
8	8711	Total amounts from each bank account where the interest was between 1% and 3% for the year 2002 and greater than 1% for the year 2001 (8711)				SUMIFS(B2:E2,B5:E5,">=1%",B5:E5,"<=3%",B4:E4,">1%")					

## COUNTIFS

The **COUNTIFS** function, counts a range based on multiple criteria.

**COUNTIFS(range1, criteria1,range2, criteria2...)**

**RANGE1, RANGE2, ...** are 1 to 127 ranges in which to evaluate the associated criteria. Cells in each range must be numbers or names, arrays, or references that contain numbers. Blank and text values are ignored.

**CRITERIA1, CRITERIA2, ...** are 1 to 127 criteria in the form of a number, expression, cell reference, or text that define which cells will be counted. For example, criteria can be expressed as 32, "32", ">32", "apples", or B4.

### ➤ To use COUNTIFS function

#### Mouse

ac) Click on the **MORE FUNCTIONS** button in the **FORMULAS** group on the **FORMULAS** ribbon and click on **STATISTICAL**.

ad) Select **COUNTIFS** from the displayed functions. A dialog will be displayed

**Function Arguments**

**COUNTIFS**

Criteria\_range1  = reference

Criteria1  = any

Criteria\_range2  = reference

Criteria2  = any

=

Counts the number of cells specified by a given set of conditions or criteria.

**Criteria\_range2:** is the range of cells you want evaluated for the particular condition.

Formula result =

[Help on this function](#)

OK Cancel

ae) Click in the **CRITERIA\_RANGE1** box select the range of cells that you wish to count.

af) Click in the **CRITERIA1** text box and type in the criteria to measure against your **CRITERIA\_RANGE1**.

E11		COUNTIFS(B5:D5,"=Yes",B3:D3,"=Yes")					
	A	B	C	D	E	F	G
1	Sales Person	Exceeded Widgets Quota	Exceeded Gadgets Quota	Exceeded Doodads Quota			
2	Davolio	Yes	No	No			
	Buchanan	Yes	Yes	No			
3							
4	Suyama	Yes	Yes	Yes			
5	Leverling	No	Yes	Yes			
6							
7							
8	Formula	Description (result)			Formula		
1		Counts how many times Davolio exceeded a sales quota for Widgets, Gadgets, and Doodads (1)			COUNTIFS(B2:D2,"=Yes")		
9							
2		Counts how many sales people exceeded both their Widgets and Gadgets Quota (2)			COUNTIFS(B2:B5,"=Yes",C2:C5,"=Yes")		
10							
1		Counts how many times Leverling and Buchanan exceeded the same quota for Widgets, Gadgets, and Doodads (1)			COUNTIFS(B5:D5,"=Yes",B3:D3,"=Yes")		
11							

ag) Repeat step 4 to enter multiple criteria, criteria\_range2, range3 etc, as you use each **CRITERIA\_RANGE** and **CRITERIA** more text boxes will appear for you to use. Click **OK** when all ranges and criterias have been entered.

Each cell in a range is counted only if all of the corresponding criteria specified are true for that cell.

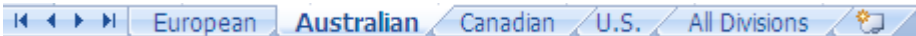
If criteria is an empty cell, **COUNTIFS** treats it as a 0 value.

You can use the wildcard characters, question mark (?) and asterisk (\*), in criteria. A question mark matches any single character; an asterisk matches any sequence of characters. If you want to find an actual question mark or asterisk, type a tilde (~) before the character.

## 1.7 Data consolidation


To summarize and report results from separate worksheets, you can consolidate data from each separate worksheet into a master worksheet. The worksheets can be in the same workbook as the master worksheet or in other workbooks. When you consolidate data, you are assembling data so that you can more easily update and aggregate it on a regular or ad hoc basis.

	A	B	C	D	E
1	<b>European Division</b>				
2					
3	<i>Item</i>	<i>QTR1</i>	<i>QTR2</i>	<i>QTR3</i>	<i>QTR4</i>
4	Bonnets	500	800	900	1000
5	Funnels	400	100	800	800
6	Reels	200	500	500	400
7	Trays	200	300	500	300
8		1300	1700	2700	2500
9					


E.G. If  you have a worksheet of sales figures for each of your divisional offices, you might use a consolidation to roll up these figures into a corporate sales worksheet. This master worksheet (All divisions) might contain sales totals or averages for the entire enterprise.

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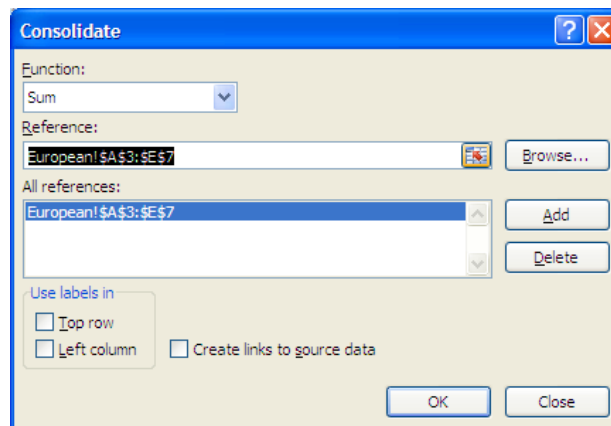
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➤ **To consolidate data**

Mouse

ah) Name a new sheet to summarise your aggregate data go to the top left hand cell on that sheet where you would like to start aggregate your data. In example above the cell would possibly be A3 on all divisions sheet.) Make sure that you leave enough cells to the right and below this cell for the consolidated data. The **CONSOLIDATE** command populates the area as needed



- ai) On the **DATA** ribbon in the **DATA TOOLS** group, click on consolidate the **CONSOLIDATE** dialog box is displayed.
- aj) From the **FUNCTION** drop down box select which function you wish to apply to the consolidated data ranges (default is sum)
- ak) Click in **REFERENCE** text box. Select one of the sheets you wish to consolidate and select the data on that sheet the range will appear in the **REFERENCE** box you will notice it is absolute.

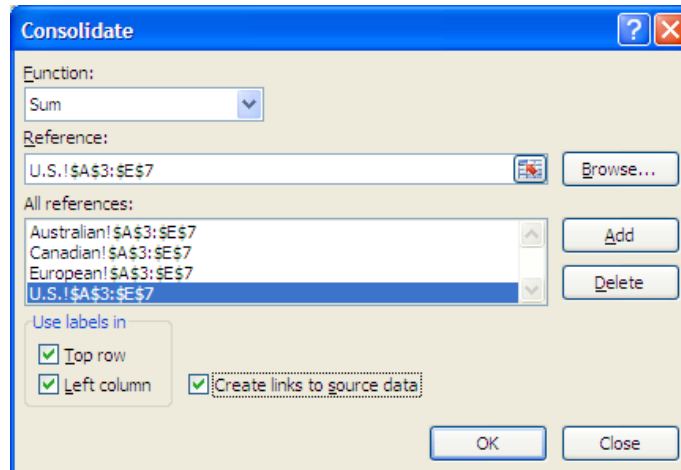
If the worksheet is in another workbook, click Browse to locate the file, and then click OK to close the Browse dialog box. The file path is entered in the Reference box followed by an exclamation point.

Alternatively,(and easier) ensure all workbooks that have sheets to be consolidated are already open. Then just like selecting the range click in the **REFERENCE** box, then select the workbook from the **TASKBAR**, select the sheet then the range and click on **ADD**.

Be consistent with your selections although the ranges may be in different locations on different sheets, either, select the labels on **ALL THE SHEETS** with the data to be consolidated OR **NONE AT ALL**.

- al) Click on **ADD** the range will appear in the **ALL REFERENCES** box if the wrong range has been selected select it in the **ALL REFERENCES** box and click on **DELETE**.

- am) Repeat the previous two steps until all data ranges to be consolidated have been selected and added to **ALL REFERENCES** box.
- an) If you selected labels in your data ranges then tick the check boxes in the **USE LABELS IN** area. Select **TOP ROW** and/or **LEFT COLUMN**.
- ao) The data when consolidated can be automatically updateable by selecting the check box **CREATE LINKS TO SOURCE DATA**. This ensures as your data changes so will your consolidated data.



You can only select this check box if the worksheet is in another workbook. Once you select this check box, you won't be able to change which cells and ranges are included in the consolidation.

To set up the consolidation so that you can update the consolidation manually by changing the included cells and ranges, clear the Create links to source data check box.

- ap) If you are satisfied with all ranges selected and options selected, click **OK**.
- aq) The data will be consolidated onto your summary worksheet
- ar) Data is consolidated

C14		fx =Australian!\$B\$6					
1	2	A	B	C	D	E	F
	1	All Divisions					
	2						
	3			QTR1	QTR2	QTR3	QTR4
+	8	Bonnets		1200	2700	3200	3000
+	13	Funnels		1100	1400	2700	2800
.	14	3Dsheets2		300	400	1400	700
.	15	3Dsheets2		200	500	500	600
.	16	3Dsheets2		200	500	500	400
.	17	3Dsheets2		200	400	100	300
-	18	Reels		900	1800	2500	2000
+	23	Travs		900	1200	1700	2100

If you selected the **CREATE LINKS TO SOURCE DATA** check box your data will be automatically outlined (see left and below **NAME BOX**) use these outlines as you would in **SUBTOTALS**. The **CREATE LINKS TO SOURCE DATA** check box works best when consolidating across workbooks as you can see in the above picture across sheets enters the sheet name in the B column repeatedly you would have to change this manually but across workbooks the filename is entered there to inform you of the source of the data.

If you did not use the **CREATE LINKS TO SOURCE DATA** check box then the data will be consolidated and put into your cells as values (averaged or summed as you chose)

C5		fx 1400			
	A	B	C	D	E
1	<b>All Divisions</b>				
2					
3		QTR1	QTR2	QTR3	QTR4
4	Bonnet	1200	2700	3200	3000
5	Funnel	1100	1400	2700	2800
6	Reels	900	1800	2500	2000
7	Trays	900	1200	1700	2100

## Section 2 Views, Scenarios, goal seek and solver

By the end of this section you will be able to:

- Create Views
- Use Goal seek and solver
- Switch between Views
- Create Scenarios
- Switch between Scenarios

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## 2.1 Goal Seeking and Solving

Excel has a number of ways of altering conditions on the spreadsheet and making formulae produce whatever result is requested. Excel can also forecast what conditions on the spreadsheet would be needed to optimise the result of a formula. For instance, there may be a profits figure that needs to be kept as high as possible, a costs figure that needs to be kept to a minimum, or a budget constraint that has to equal a certain figure exactly. Usually, these figures are formulae that depend on a great many other variables on the spreadsheet. Therefore, you would have to do an awful lot of trial-and-error analysis to obtain the desired result. Excel can, however, perform this analysis very quickly to obtain optimum results. The Goal Seek command can be used to make a formula achieve a certain value by altering just one variable. The Solver can be used for more painstaking analysis where many variables could be adjusted to reach a desired result. The Solver can be used to not only obtain a specific value, but also to maximise or minimise the result of a formula (e.g. maximise profits or minimise costs).

### Goal Seek

B10      fx      =B3-B8				
	A	B	C	D
1				
2				
3	Revenue	5000		
4				
5	Advert costs	300		
6	Payroll	1150		
7				
8	Total costs	1450		
9				
10	Profits	3550		
11				

The Goal Seek command is used to bring one formula to a specific value. It does this by changing one of the cells that is referenced by the formula. Goal Seek asks for a cell reference that contains a formula (the Set cell). It also asks for a value, which is the figure you want the cell to equal. Finally, Goal Seek asks for a cell to alter in order to take the Set cell to the required value.

In the example spreadsheet, cell B8 contains a formula that sums advertising and payroll costs. Cell B10 contains a profits formula based on the revenue figure, minus the total costs.

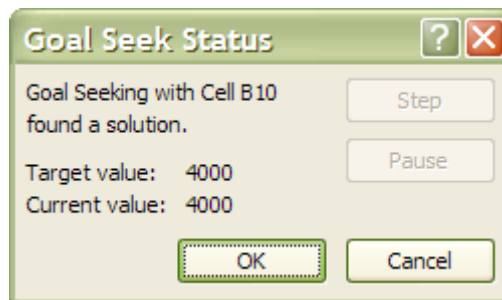
A user may want to see how a profit of 4000 can be achieved by altering payroll costs.



➤ **To launch the Goal seeker:**

Mouse

- On the **DATA** ribbon, **DATA TOOLS** group, click **WHAT-IF ANALYSIS** and then click **GOAL SEEK**.
- In the **SET CELL** box, enter the reference for the cell that contains the formula result you wish to set to a specific figure. (In the example, this is cell B4.)
- In the **TO VALUE** box, type the result you want. (In the example, this is -4000.)
- In the **BY CHANGING CELL** box, enter the reference for the cell that contains the value you want to adjust. (In the example, this is cell B3.)



*The Goal Seek command automatically suggests the active cell as the Set cell. This can be overtyped with a new cell reference or you may click on the appropriate cell on the spreadsheet.*

- Click the **OK** button and the spreadsheet will alter the cell to a value sufficient for the formula to reach your goal. Goal Seek also informs you that the goal was achieved;
- You now have the choice of accepting the revised spreadsheet, or returning to the previous values. Click **OK** to keep the changes, or **CANCEL** to restore previous values.

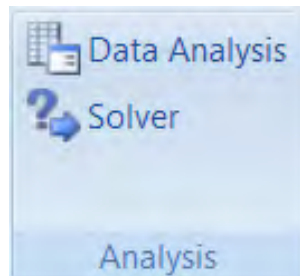
*Goal Seek can be used repeatedly in this way to see how revenue or other costs could be used to influence the final profits. Simply repeat the above process and alter the changing cell reference.*

*The changing cell must contain a value, not a formula. For example, if you tried to alter profits by changing total costs, this cell contains a formula and Goal Seek will not accept it as a changing cell. Only the advertising costs or the payroll cells can be used as changing cells.*

*Goal Seek will only accept one cell reference as the changing cell, but names are acceptable. For instance, if a user had named either cells B5 or B6 as "Advert\_costs" or "Payroll" respectively, these names could be typed in the BY CHANGING CELL box. For goal-seeking with more than one changing cell, use the Solver.*

## Solver

For more complex trial-and-error analysis the Excel Solver should be used. Unlike Goal Seek, the Solver can alter a formula not just to produce a set value, but also to maximise or minimise the result. More than one changing cell can be specified, so as to increase the number of possibilities, and constraints can be built in to restrict the analysis to operate only under specific conditions.



The basis for using the Solver is usually to alter many figures to produce the optimum result for a single formula. This could mean, for example, altering price figures to maximise profits. It could mean adjusting expenditure to minimise costs, etc. Whatever the case, the variable figures to be adjusted must have an influence, either, directly or indirectly, on the overall result, that is to say the changing cells must affect the formula to be optimised. Up to 200 changing cells can be included in the solving process, and up to 100 constraints can be built in to limit the Solver's results.

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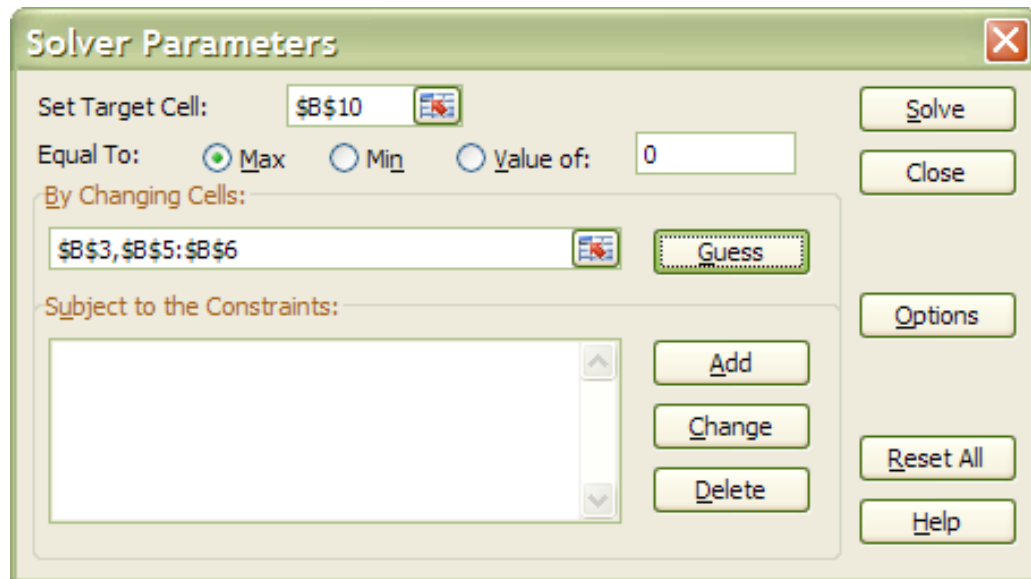
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## Solver Parameters

The Solver needs quite a lot of information in order for it to be able to come up with a realistic solution. These are the Solver parameters



### ► To set up the Solver:

#### Mouse

- Click **SOLVER** button on the in the **ANALYSIS** group on the **DATA** Ribbon;

*Like Goal Seek, the Set Cell is the cell containing the formula whose value is to be optimised. Unlike Goal Seek, however, the formula can be maximised or minimised as well as set to a specific value.*

- Decide which cells the Solver should alter in order to produce the Set Cell result. You can either type or click on the appropriate cells, and [Ctrl] click if non-adjacent cell references are required.

When using a complex spreadsheet, or one that was created by someone else, there is an option to let the Solver guess the changing cells. Usually it will select the cells containing values that have an immediate effect on the Set Cell, so it may be a good idea to amend this.

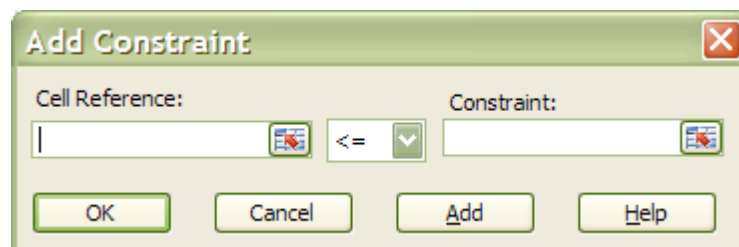
## Constraints

Constraints prevent the Solver from coming up with unrealistic solutions.

### ► To build constraints into your Solver parameters:

Mouse

- a) In the Solver dialog, choose **ADD**
- b) This dialog box asks you to choose a cell whose value will be kept within certain limits. It can be any cell or cells on the spreadsheet (simply type the reference or select the range).
- c) This cell can be subjected to an upper or lower limit, made to equal a specific value or forced to be a whole number. Drop down the arrow in the centre of the Constraint box to see the list of choices:- To set an upper limit, click on the  $\leq$  symbol; for a lower limit,  $\geq$ ; the  $=$  sign for a specific value and the INT option for an integer (whole number).
- d) Once the **OK** button is chosen, the Solver Parameter dialog box re displays and the constraint appears in the window at the bottom. This constraint can be amended using the Change button, or removed using the Delete button.



When maximising or minimising a formula value, it is important to include constraints which set upper or lower limits on the changing values. For instance, when maximising profits by changing sales figures, the Solver could conceivably increase sales to infinity. If the sales figures are not limited by an upper constraint, the Solver will return an error message stating that the cell values do not converge. Similarly, minimising total costs could be achieved by making one of the contributing costs infinitely less than zero. A constraint should be included, therefore, to set a minimum level on these values.

The example here shows the number of cases for five London hospitals, split into three types: Elective, Emergency and Day cases. Below this are the respective costs of each type of case for each hospital, and finally the total costs (number multiplied by price) for each type in each hospital. All these figures are totalled in column H, to arrive at a final total costs figure in cell H17.

	A	B	C	D	E	F	G	H	I
1									
2									
3		BARTS	CHAR X	HAMSMITH	MOORFIELDS	ST GEORGES			
4	Elective	4	5	5	4	7		25	
5	Emerg	3	2	4	5	3		17	
6	Day	9	8	7	10	6		40	
7		16	15	16	19	16		82	Total Cases
8									
9	Elective	11	9	13	2.4	6		41.4	
10	Emerg	8	8.2	10	5	4		35.2	
11	Day	3	6	14	3	2		28	
12		22	23.2	37	10.4	12		104.6	Total Cases
13									
14	Elective	44	45	65	9.6	42		205.6	
15	Emerg	24	16.4	40	25	12		117.4	
16	Day	27	48	98	30	12		215	
17		95	109.4	203	64.6	66		538	Total Cases

**Question:**

What do Skype and Spotify have in common with color screen graphics and the computer mouse?

–They are all Swedish inventions.

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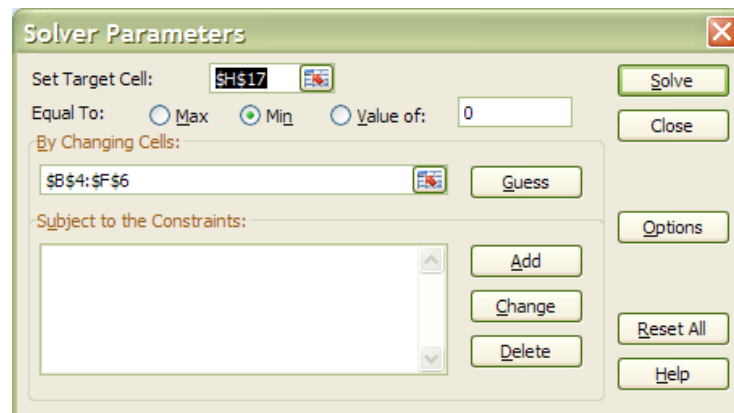
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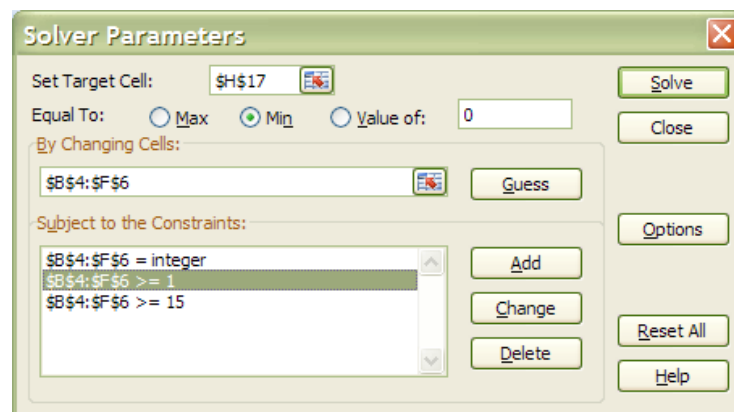


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Call up **SOLVER** from the **ANALYSIS** group on the **DATA** ribbon. The Set Cell in this case will be H17, the total costs cell. It can be assumed that the costs of cases cannot be changed, only the number in each hospital, therefore the changing cells will be B4:F6:

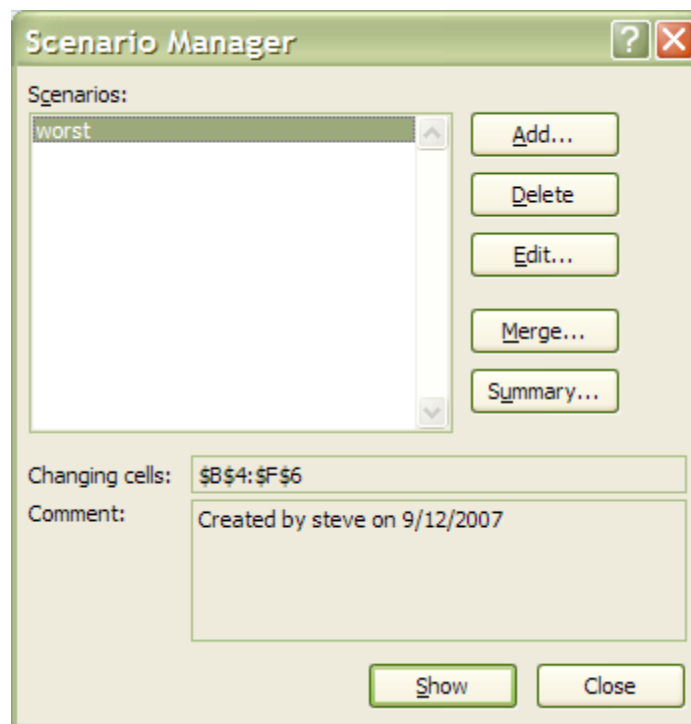


The problem is that, if Solve is chosen now, the number of cases could reduce to infinitely below zero and produce an error message. Fortunately, constraints can be built in to force each hospital to have a minimum number of cases, and for there to be a total number of cases overall. Choose the **ADD** option to add a constraint, highlight the cells B4:F6, drop down the arrow and click on  $\geq$  to set a minimum limit. Here, type whatever the minimum number of cases should be. To avoid the error message, simply type 1 and choose **OK**. Also, as hospital cases cannot be fractions, add another constraint to force these cells to be integers. Finally, a constraint could be added to set a total number of cases (cell H7). The Solver parameters should now appear as follows:



When Solve is chosen, the Solver carries out its analysis and finds a solution. This may be unsatisfactory, as it has calculated that the best way to minimise costs is to put the majority of cases in St George's as day patients. Further constraints could now be added to force the Solver to place minimum numbers of cases in the other hospitals, or set a maximum limit on St Georges' day cases.

## Solver And Scenario Manager



The Solver uses sophisticated numeric analysis and iterative methods to perform trial-and-error calculations very quickly. The original values of the spreadsheet, therefore, have a profound effect on the result of a Solver solution. It may be the case that there is no concrete solution to a spreadsheet problem, and the Solver may produce a “best guess” within the specified constraints. Changing the original values and running the Solver again may produce a different result, and it may therefore be helpful to save the different “scenarios” that are produced. It may also be necessary to save scenarios where constraints have either been added, removed or amended. Using Excel’s Scenario Manager can facilitate this, by allowing you to save each new Solver solution and compare it to previous ones. For most complex spreadsheet problems, the Solver and Scenario Manager are used together.

### Opening Scenario Manager

#### ➤ To open scenario manager

##### Mouse

- a) Click **SCENARIO MANAGER** on the **WHAT IF ANALYSIS** button on the in the **DATA TOOLS** group on the **DATA** Ribbon; ( the text “what if analysis” will be missing if solver has been added in to Excel)
- b) Scenario manager will appear.

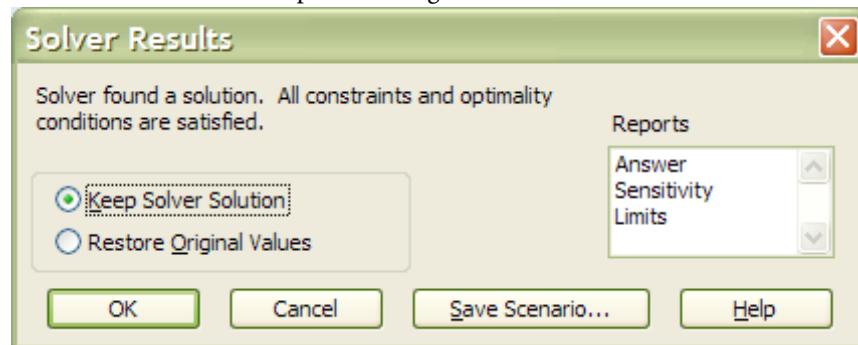
## Saving Solver Solutions

When the Solver finds a solution that seems feasible, you may want to save it.

### ➤ Save a solution as a Scenario:

#### Mouse

- a) Once Solver has found a solution, choose **SAVE SCENARIO** from the dialog box. The scenario can be named and either the new values kept or the original values restored.



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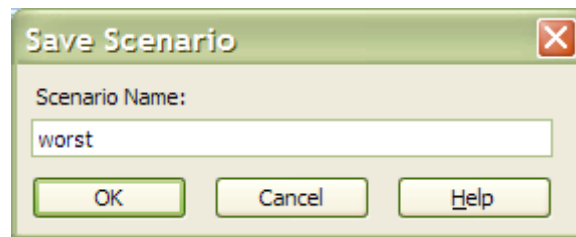
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➤ **To view a saved Scenario:**

Mouse



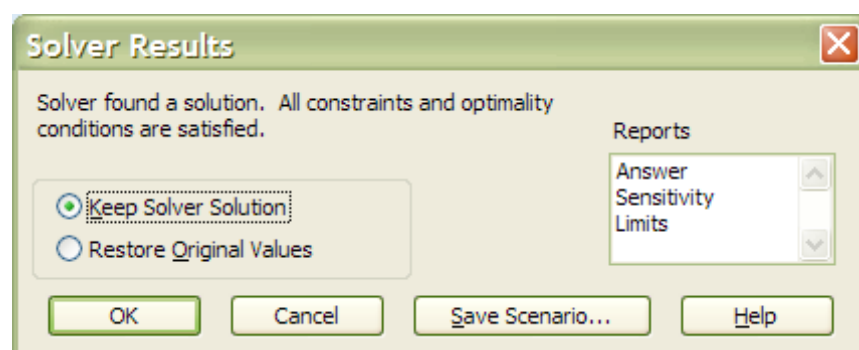
- Click **SCENARIO MANAGER** on the **WHAT IF ANALYSIS** button on the in the **DATA TOOLS** group on the **DATA** Ribbon; ( the text “what if analysis” will be missing if solver has been added in to Excel)
- Scenario manager will appear. All named scenarios will be listed.
- Click on the appropriate name and choose **SHOW** to display the results. Typically, a scenario only holds the results of the changing cells set in any Solver Parameters. Choosing Edit from the Scenario Manager allows these values to be changed, or the Scenario renamed.

## Reports

Once a Solver solution is obtained, a report can be generated to summarise the changes that have been made and how accurately the constraints have been satisfied. When changing cells have integer constraints, the only meaningful type of report is an Answer Report, which gives details of the target cell's original value and new value, the changes to the adjustable cells as well as all constraints.

➤ **To create a solver report:**

Mouse



- Click **Answer Report** from the Solver Solution dialog box. Excel generates the report in a new sheet behind the current worksheet.

- b) To see the report, choose the answer report ribbon: behind current worksheet

	A	B	C	D	E	F																																																												
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2	Worksheet: [advanced.xlsx]Sheet9																																																																	
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## 2.2 Views & Scenarios

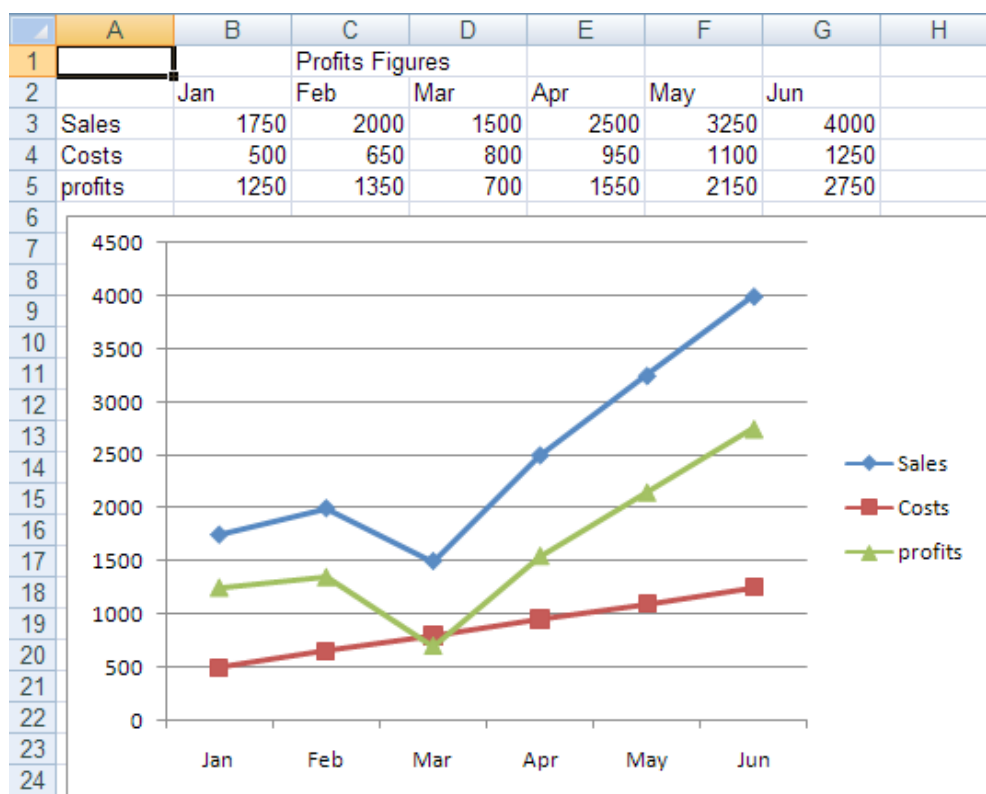
Excel's Custom Views are used to save and recall different display settings and print options. The Scenario Manager allows you to store changes to spreadsheet data and perform "what if" analysis.

### Custom Views

Custom views allow you to save different display and print settings, and impose them quickly and easily on the worksheet at any time. The settings which can be saved include print settings, row heights and column widths, display settings, selected cells, window size and positions, settings for panes and frozen titles. This can be advantageous when dealing with large worksheets where switching from one area to another might otherwise be awkward. It also allows a number of different print settings - including print area - to be saved as part of the same worksheet file.

### Typical Custom View Model

In the example above, Sales, Costs and Profits data can be seen at the top of the screen, with an embedded line chart underneath. There is also an embedded pie chart, which, at the moment, can only be seen by scrolling down the spreadsheet. It would be useful to be able to “swap” between the line chart and the pie chart while still able to see the spreadsheet figures. It may also be helpful to define different page settings, depending on whether the line chart or pie chart is being printed. By defining different spreadsheet “views,” it is possible to toggle between the different charts and keep the data on the screen at all times. It is also possible to print a different header when a different type of chart is displayed.



### Defining A View

Before defining a view, you should ensure that the display options, zoom percentage, print settings etc. are as you wish to record them.

- To create a view:



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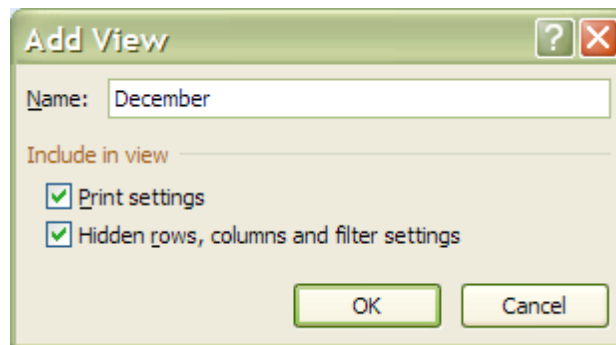
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Mouse

- a) Click View from the menu bar and choose Custom Views. The following dialog box will appear:
- b) From the Custom Views dialog box, choose **ADD**.
- c) Choose whether or not to include print settings or hidden rows and columns as part of the View by checking the required options.
- d) Enter the name under which this view is to be saved and click on **OK**.



Once a view has been defined, the display and print settings of the worksheet can be changed (for example in our typical model you may want a view to display the pie chart next to the data with an appropriate header when printing). You can then set up a View that would save those settings.

### Showing A View

Having defined as many views as are needed for the current worksheet, you can switch between them.

➤ **To show a view:**

Mouse

- a) Click on the **VIEW** ribbon **WORKBOOK VIEWS** group, and **CUSTOM VIEWS**.
- b) Click on the **SHOW** button. If Print or Print Preview commands are executed, the correct settings (including the header) will be apply to each view.

➤ **To delete a view:**

Mouse

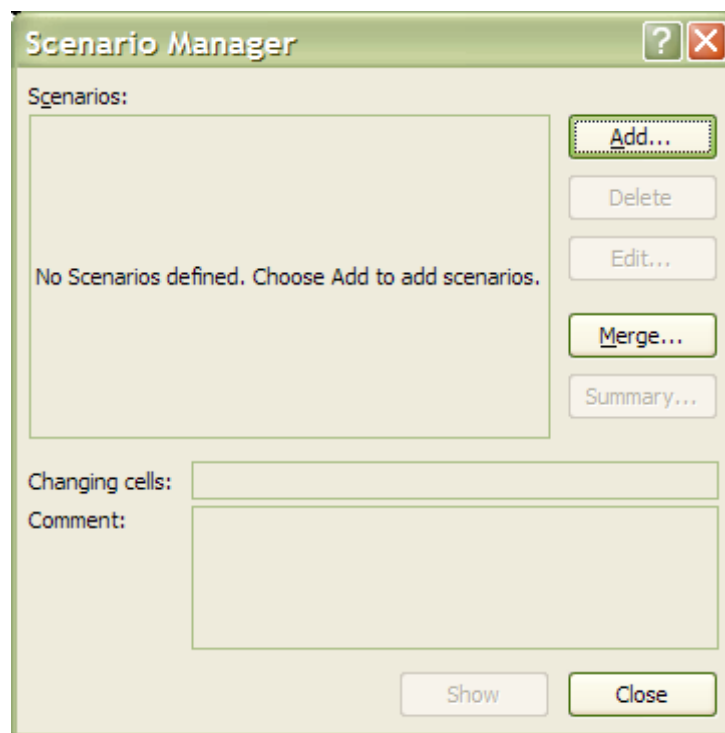
- a) Click on the **VIEW** ribbon **WORKBOOK VIEWS** group, and **CUSTOM VIEWS**.
- b) Click the **DELETE** button.

## Scenario Manager

The purpose of the Scenario Manager is to allow you to save a number of alternative inputs for specific cells which affect the results in a worksheet. For example, you may want to see the results of changes in costs figures, and their impact on profits. A variety of different costs figures could be saved as different “scenarios,” and each one loaded in turn to produce comparisons.

### Load The Scenario Manager

Once you have constructed your worksheet with the appropriate data and formulae, you are ready to set up scenarios.



#### ➤ To set up scenarios:

##### Mouse

- Click **SCENARIO MANAGER** on the **WHAT IF ANALYSIS** button on the in the **DATA TOOLS** group on the **DATA** Ribbon; (the text “what if analysis” will be missing if solver has been added in to Excel)
- :Click the **ADD** button to name your scenario and define the **CHANGING CELLS** (the cells containing the values you want to vary for each scenario). The following dialog will appear:
- Type a name in the box marked **SCENARIO NAME**.
- Click the button to the right of the **CHANGING CELLS** box to collapse the dialog allowing you to view the worksheet and select the cells containing the variables. Non consecutive cells may be selected using [Ctrl] and click. Click the button to expand the Add Scenario dialog once more.



**Edit Scenario**

Scenario name:  
December

Changing cells:  
\$B\$7:\$G\$7

Ctrl+click cells to select non-adjacent changing cells.

Comment:  
Created by steve on 13/09/2007

**Protection**

☒ Prevent changes  
☐ Hide

OK Cancel

- e) Click **OK** to add the Scenario. The following dialog box will appear:
- f) Type the value for the first changing cell that you want to save under the current scenario name. Press [RIBBON] to move to the next changing cell and type a value for that changing cell. Repeat the process until all changing cell values have been set for the current scenario.
- g) Click the **OK** button to return to the Scenario Manager dialog
- h) Click **OK** again to exit the Scenario Manager.

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Scenario	Changing Cell	Value
1:	\$B\$7	365000
2:	\$C\$7	1265000
3:	\$D\$7	737000
4:	\$E\$7	745000
5:	\$F\$7	370000

**OR**

- Click the **ADD** button to define another scenario.
- When all scenarios have been added, click **OK** to return to the Scenario Manager dialog and **OK** to exit the Scenario Manager.

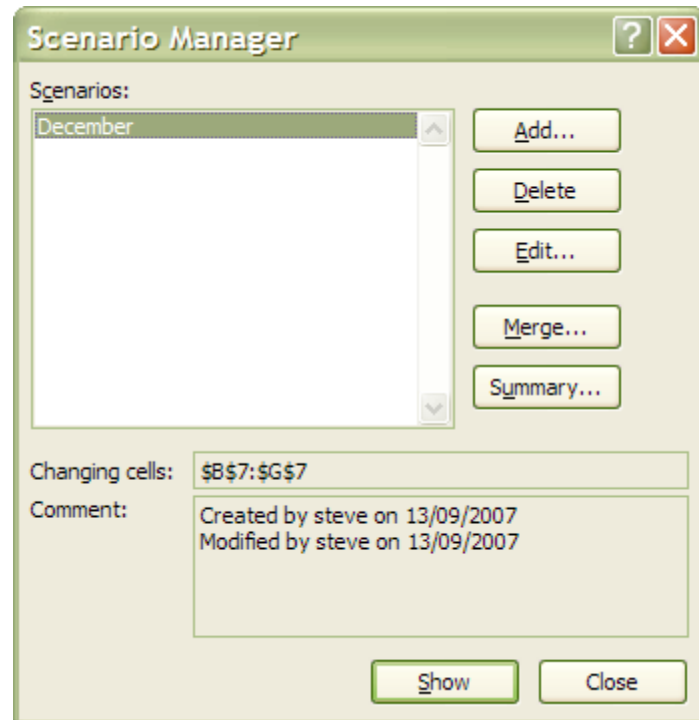
**Showing A Scenario**

When several scenarios have been created, each one in turn can be shown. The values associated with that scenario will appear in the designated Changing Cells, and all the dependant formulae on the worksheet will update. Any charts dependant on the changing values will also update. The Scenario Manager dialog box will remain on screen, allowing you to click on an alternative scenario name and show it instead.

**➤ To show scenarios:****Mouse**

- Click **SCENARIO MANAGER** on the **WHAT IF ANALYSIS** button on the in the **DATA TOOLS** group on the **DATA** Ribbon; (the text “what if analysis” will be missing if solver has been added in to Excel)
- Double-click the scenario name whose values you want on the worksheet. The values will appear in the changing cells.
- The dialog box remains on-screen allowing you to double-click other scenario names and see how the changing values affect the data. Click **OK** to exit the Scenario Manager dialog.





### Editing A Scenario

There are two main ways in which you might wish to change an existing scenario. You might want to amend the values of the changing cells, or add or delete changing cells. The approach is slightly different for each of these tasks.

#### ➤ To change values in a scenario

##### Mouse

- Click **SCENARIO MANAGER** on the **WHAT IF ANALYSIS** button on the in the **DATA TOOLS** group on the **DATA** Ribbon;
- Select the name of the scenario to be edited.
- Click on the **EDIT** button and click **OK** from the Edit Scenario dialog.
- Change the values as required, and click on the **OK** button. This procedure can be repeated if necessary to edit other scenarios.

#### ➤ To add changing cells:

##### Mouse

- Click **SCENARIO MANAGER** on the **WHAT IF ANALYSIS** button on the in the **DATA TOOLS** group on the **DATA** Ribbon; (

- b) Select the name of the scenario to be edited.
- c) Click on the **EDIT** button and click the button to the right of the **CHANGING CELLS** box to collapse the Edit Scenario dialog.
- d) Hold down the [CTRL] key as you click and drag across the cells that you want to add. Click the button to expand the dialog. Click **OK** to confirm the addition.
- e) Enter the value for the newly added changing cell in the Changing cells dialog and click **OK** to confirm.
- f) Click **CLOSE** to exit the Scenario Manager.

➤ **To remove changing cells:**

Mouse

- a) Click **SCENARIO MANAGER** on the **WHAT IF ANALYSIS** button on the in the **DATA TOOLS** group on the **DATA** Ribbon;
- b) Select the name of the scenario to be edited.
- c) Click on the **EDIT** button.
- d) Drag across the cell references of the cells you want to remove from the **CHANGING CELLS** box and press [DELETE]. Click **OK** to confirm the deletion and **OK** again to close the Changing cells dialog.
- e) Click **CLOSE** to exit the Scenario Manager.

Deleting A Scenario

➤ **To delete a scenario:**

Mouse

- a) Click **SCENARIO MANAGER** on the **WHAT IF ANALYSIS** button on the in the **DATA TOOLS** group on the **DATA** Ribbon;
- b) Select the name of the scenario to be deleted.
- c) Click **DELETE** button.

*You can't undo the deletion of a scenario.*

# Section 3 Using Excel to Manage Lists

## ► Objectives

By the end of this section you will be able to:

- Set up an Excel list
- Sort the list
- Create list subtotals
- Add, edit and delete list items using the data form
- Use AutoFilter to find specific list data
- Use the Advanced filtering tools
- Analyse list data with data and PivotTables



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### 3.1 Excel Lists, List Terminology

Although Excel's primary function is as a Spreadsheet, it can also be used for a number of list operations. It is possible to store, and manipulate information (customer records, staff records or stock inventories for example) on an Excel worksheet, organise it in different ways, and "query" the list to extract information which meets specific, user-defined criteria. The list is effectively treated as a database.

In order to use Excel's database capacity, information must be laid out in rows and columns subject to certain constraints. There are some database terms with which the user should become familiar:

#### Row And Column Content

The information being stored must be divided up into categories. For example, information on staff might include Firstname, Lastname and Department. In an Excel List, each category must be entered in a separate column. Do not mix text and numbers in a column – the data must belong to the same category of information and therefore should be the same data type. Do not use spaces in front of column entries, use alignment buttons instead if you need to move data away from the column edges.

#### Column Labels

This is the title at the top of each column, describing the category of information which it contains. Each label name must be unique and must be made up of text rather than numbers or calculations. The column names must appear directly above the list information - they may not be separated from the rest of the list by a blank row. Format your column labels to distinguish them from the list data.

#### List Size And Location

The List is the whole collection of information, all Fields, Fieldnames and Records and should be laid out as a regular block of data. (see specifications for list limits)

Do not place more than one list on a worksheet. If you want more than one list in a workbook, place each list on a separate sheet. (this is only a guide it will not affect functionality but when working with lists hidden rows can cause severe problems with other lists on same sheet)

Leave at least one blank row and one blank column between the list and other data on the worksheet.

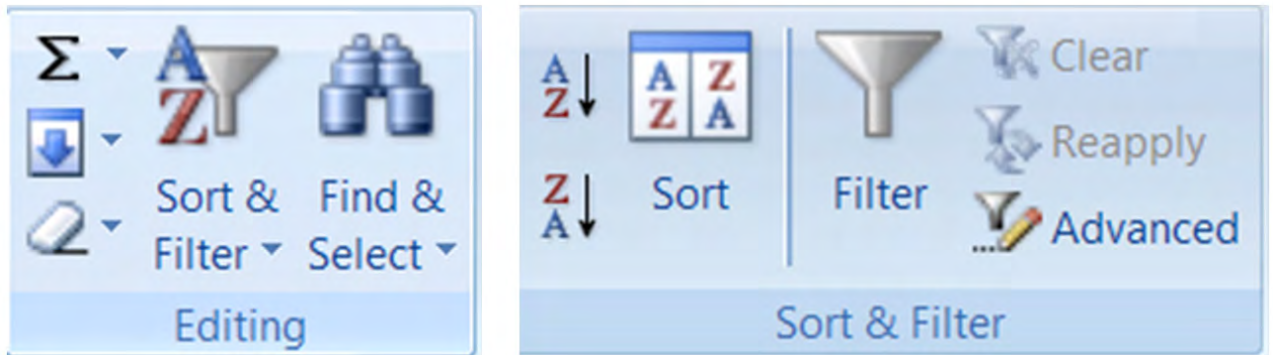
Place additional data diagonally below and to the right of your list. This ensures that data will not be affected when you filter the list.

#### Miscellaneous

Excel does not distinguish between upper and lower case characters in a list, unless you use the Case-sensitive sort option.

When you use formulae in lists, Excel uses the results of the formulae.

### 3.2 Sorting Data



Although not confined to database information, the sorting facility in Excel is particularly appropriate for changing the order in which records are listed. Remember to save the file containing the database information prior to sorting.

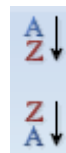
If you will need to restore the original record order, it is a good idea to include a column of record numbers before sorting the database. This can be achieved simply by adding a column with a suitable heading, and using the fill handle or the data series command to enter consecutive numbers adjacent to each record.

When using any data handling techniques ensure you have: -1. Selected a cell somewhere in the data list. 2. Have NO MORE than one cell selected

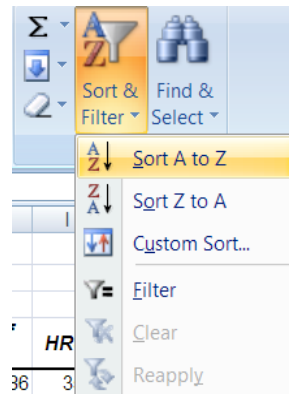
Excel automatically selects the entire list for sorting. It compares the top rows of your list for formatting differences. If there is a difference in the formatting of the top row, Excel identifies that row as column labels and excludes it from the sort. This ensures the column labels will not be sorted with the rest of the data.

➤ **To perform a single-level sort: (quick sort)**

Mouse



- Select a cell in the list within the column by which you want to sort.
- Click the Sort Ascending or Sort Descending button from the **DATA** ribbon, **SORT & FILTER** group



OR

Mouse

- Click within the data to be sorted in the column you wish to sort by
- Click the Sort A to Z or Sort Z to A option from the Sort & Filter button on the **HOME** ribbon in the **EDITING** group
- The data will be sorted alphabetically or numerically by that column

What do you want to do?

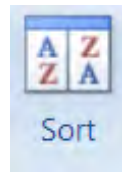
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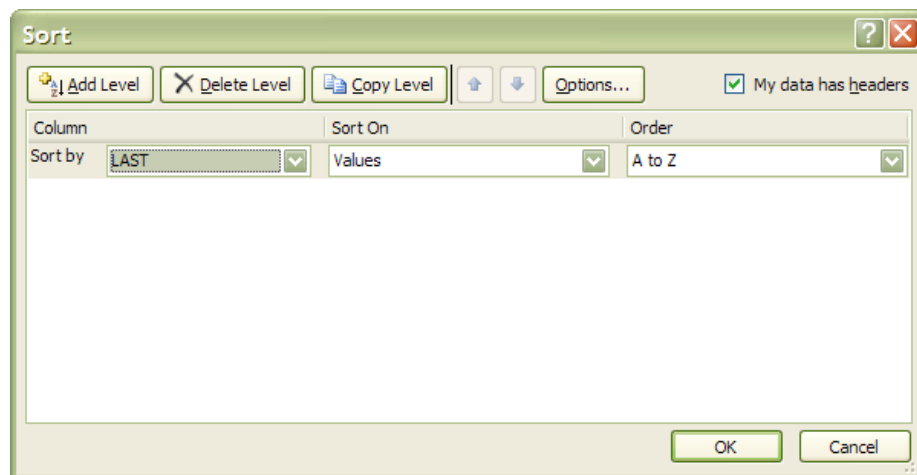
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- To perform a multi-level sort:

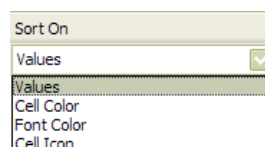


### Mouse

- Click within the data to be sorted.
- Choose Sort, button from the **DATA** ribbon, **SORT & FILTER** group The following dialog box will appear in which from which you may specify the Sort fields and the Sort order.
- From the **Sort By** drop-down list, select the field you want to use as the main sort order.



- Select from the next drop down list what you want to sort on by default this will be the data (values)
- Select the Ascending or Descending from the drop down list depending on which order you wish the data sorted in.



- Select add level
- Specify any sub-sorts using the **Then By** drop-down lists to pick the subsequent fields to sort by when duplicates occur in the main sort field.



- h) You may add many levels to your sorting of data. If you wish to reorder your sorting levels use the reorder buttons by selecting a level and moving it up or down
- i) If you have an incorrect level in your many sort orders. Select it and click on delete level.
- j) Click **OK**. to apply sort orders

**OR**

Mouse

- a) Click the Custom sort option from the Sort & Filter button on the **HOME** ribbon in the **EDITING** group
- b) The custom sort dialog will appear.
- c) Continue as previous
- d) Click **OK**. to apply sort orders

### Custom Sorting Options

The ascending and descending sort orders rearrange your list by alphabetical, numerical, reverse alphabetical or reverse numerical order. For some types of data, such as months, this may not be the order that you need to use. You can use one of the custom sort orders provided with the Excel program to rearrange your data in chronological order by day of the week or by month.

➤ **To sort by a custom sort order:**

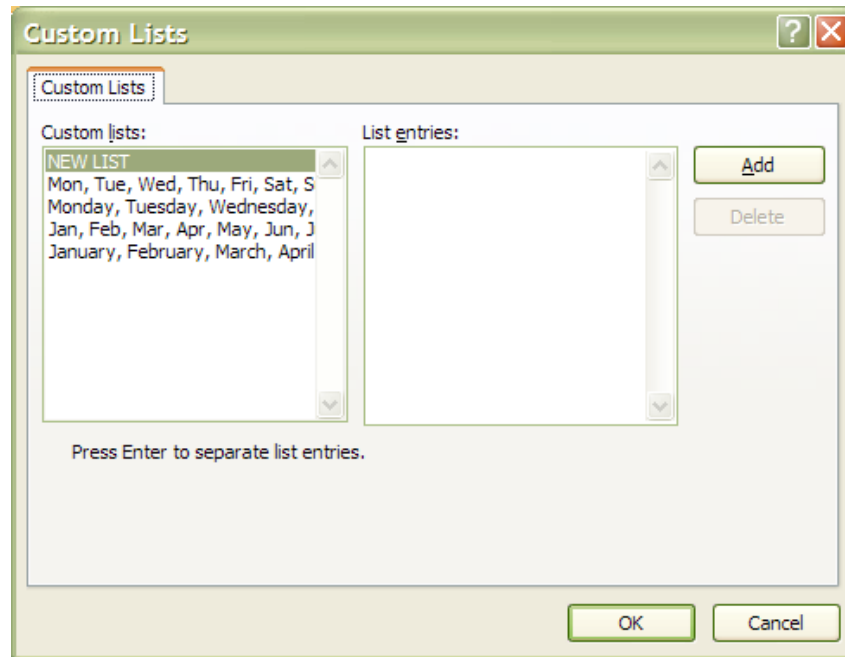
Mouse

- a) Place the active cell within the list.
- b) Click the Custom sort option from the Sort & Filter button on the **HOME** ribbon in the **EDITING** group

**OR**

- a) Choose **SORT**, button from the **DATA** ribbon, **SORT & FILTER** group.
- b) From the **SORT BY** drop-down list, select the column by which you want to sort.
- c) From the **SORT ON** drop down list select what you want to sort on (Values)





- d) From the **ORDER** drop down list select **CUSTOM LIST**
- e) The following dialog box will appear
- f) Select a custom list from the left hand box.
- g) Click on **OK** to close the list dialog and apply sort order to level and click on **OK** again to perform the sort.



### Creating A Custom Sort Order

When sorting by ascending, descending or chronological order is not suitable for the data in a list, you can create a custom sort order. Custom sort orders enable you to give Excel the exact order to rearrange data. Custom sort orders are helpful for data such as Low, Medium, High, where neither alphabetical nor an existing custom sort order will provide the desired results.

#### ► To create a custom sort order:


##### Mouse

- a) Click the Custom sort option from the Sort & Filter button on the **HOME** ribbon in the **EDITING** group

##### OR

- a) Choose **SORT**, button from the **DATA** ribbon, **SORT & FILTER** group.

**OR**

- a)  Click on the **MICROSOFT OFFICE BUTTON** and select the **EXCEL OPTIONS** button. In the **POPULAR** section, click on the **EDIT CUSTOM LISTS** button
- b) In the **CUSTOM LISTS** box, verify that New List is selected.
- c) In the **LIST ENTRIES** box, type each unique entry in the order you want to sort the entries. Separate the entries by pressing [ENTER].
- d) Click **ADD** the list entries will appear in the left hand box
- e) Click **OK**.

Edit Custom Lists...

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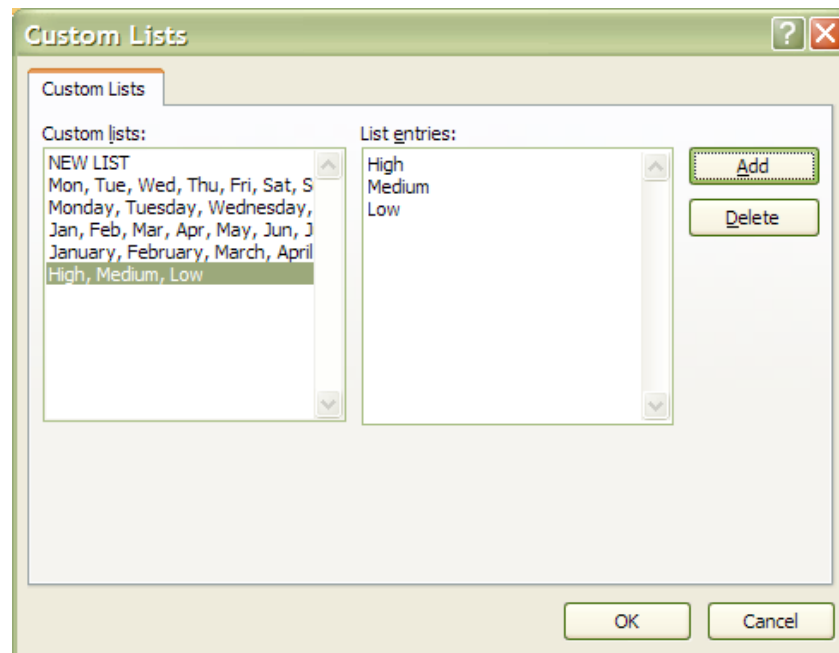
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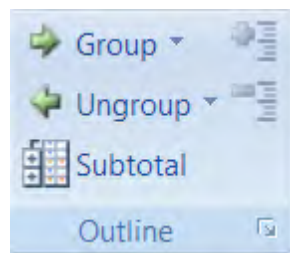


*Custom sort orders are saved with the Excel 2007 program settings and are available for use with all worksheets. You can use a custom list with the AutoFill feature.*



### 3.3 Adding Subtotals to a List

Automatic subtotals are useful in summarising the data contained in a list. Subtotals are created by using an Excel summary function such as SUM(), COUNT() or AVERAGE(). To use the subtotals, your data must be organised in a properly designed list and sorted according to the column by which you want to summarise the data.

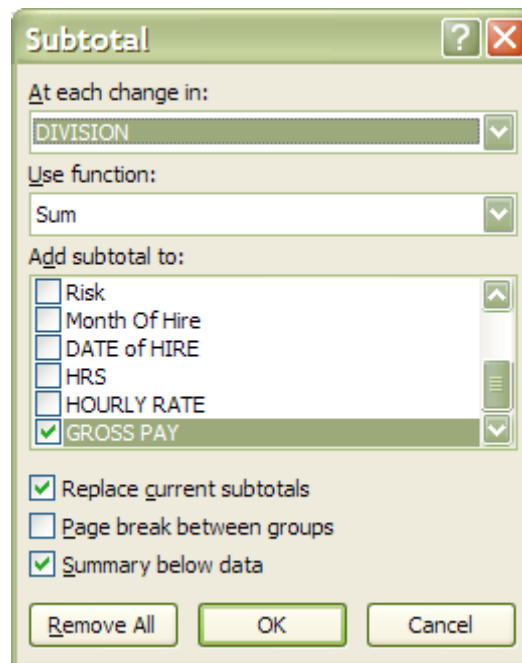


➤ To add subtotals to a list:

#### Mouse

- Sort the list according to the column by which you want to summarise the data.
- Choose **SUBTOTAL** from the **OUTLINE** group on the **DATA** ribbon.

- c) From the **At Each Change In** drop-down list, select the field by which you want to summarise the data. (the field you have the data sorted by)
- d) From the **Use Function** drop-down list, select the summary function you want to use to generate the subtotals.
- e) In the **Add Subtotal To** box, check the column or columns to which you want the function to be applied.
- f) If desired, check the options for replacing the current subtotals (if any), inserting a page break for each summary group and inserting the summary below each group.
- g) Click **OK**.



When you use the Data, Subtotals command, it adds its own Grand Total, so you should not use the SUM() function in your list. If you use the Data, Subtotals command, the SUM() function will be inaccurate since it includes the subtotals in the calculation. (see working with lists)

➤ **To remove subtotals from a set of data:**

Mouse

- a) Select a single cell somewhere within the subtotalled list.
- b) Choose **SUBTOTAL** from the **OUTLINE** group on the **DATA** ribbon
- c) Click **REMOVE ALL** and then **OK**.

## Examining Subtotals

When you insert automatic subtotals, Excel creates an outline of your data. The outline enables you to show or hide certain sections of data by clicking on the outline buttons below the Name box on the formula bar. Grand total values are derived from the list data, not the subtotal rows.

	A	B	C	D	E	F	G	H	I	J	K
	NUM	FIRST	LAST	DIVISION	DEPT	Risk	Month Of Hire	DATE of HIRE	HRS	HOURLY RATE	GROSS PAY
27				<b>Australia Total</b>							£10,924.30
28	3	Colleen	Abel	Canada	Water Rides	Medium	july	26-Jul-90	42	£16.75	£703.50
29	7	Theresa	Califano	Canada	Water Rides	Medium	february	26-Feb-89	35	£12.10	£423.50
30	9	Cheryl	Halal	Canada	Adult Rides	High	february	01-Feb-90	35.5	£13.30	£472.15
31	12	Seth	Rose	Canada	Children's Rides	Low	april	05-Apr-90	32	£5.50	£176.00
32	17	George	Gorski	Canada	Adult Rides	High	May	07-May-85	40	£22.00	£880.00
33	26	Theodore	Ness	Canada	Adult Rides	High	August	04-Aug-91	32	£5.50	£176.00
34	29	Donald	Reese	Canada	Shows	None	August	17-Aug-84	32	£5.50	£176.00
35	38	Fred	Mallory	Canada	Adult Rides	High	June	17-Jun-83	38	£15.50	£589.00
36	47	Anne	Davidson	Canada	Children's Rides	Low	april	06-Apr-86	25	£8.52	£213.00
37	48	Doug	Briscoll	Canada	Adult Rides	High	may	26-May-87	38	£15.50	£589.00
38	55	Jennifer	Snyder	Canada	Water Rides	Medium	June	07-Jun-88	25	£8.52	£213.00
39	66	Chris	Reed	Canada	Water Rides	Medium	march	27-Mar-84	35.5	£13.30	£472.15
40	69	Shirley	Dandrow	Canada	Children's Rides	Low	march	14-Mar-91	35	£12.10	£423.50
41	78	Theresa	Miller	Canada	Shows	None	march	04-Mar-91	40	£22.00	£880.00
42	86	Katie	Smith	Canada	Shows	None	October	05-Oct-86	40	£15.00	£600.00
43				<b>Canada Total</b>							£6,986.80
71				<b>Germany Total</b>							£14,562.53
102				<b>Great Britain Total</b>							£15,805.35
103				<b>Grand Total</b>							£48,278.98

Outline buttons

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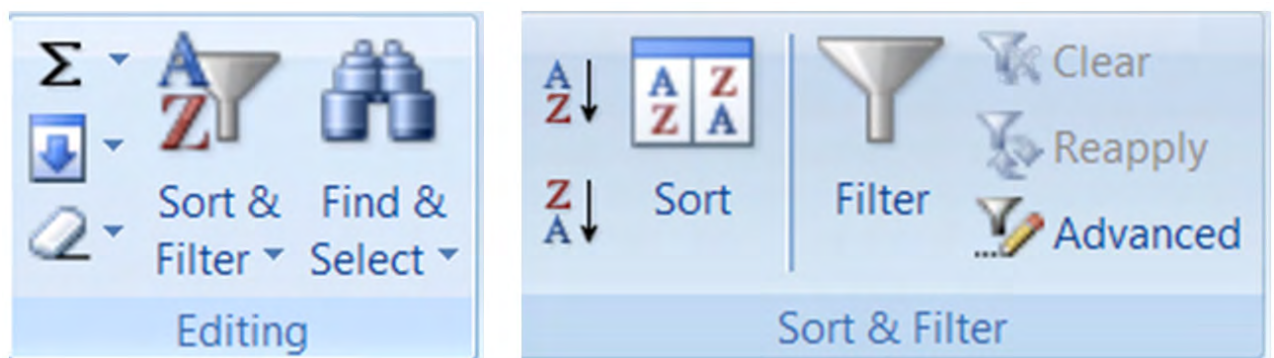
Click on the ad to read more

➤ **To examine a subtotalled list**

Mouse

- Having applied subtotals to a list, outline numbering can be seen on the far left below the name box.
- Select 1,2 or 3 to see all the data with subtotals at intervals, subtotals alone or just the grand total
- Clicking on the + or -= buttons below the outline numbers enables you to select which outline group to expand or collapse to allow printing or comparison of required data.
- Removing subtotals will remove these automatic outlines

### 3.4 Filtering a List



When you filter a list, you display only the sets of data that meet a certain set of search conditions called *criteria*. The AutoFilter feature enables you to specify those search conditions from the list.

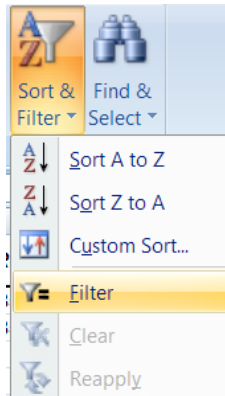
When you use the Data, Filter, AutoFilter command, drop-down list arrows are displayed next to each of the column labels in the list. When you open a drop-down list, a list of all the unique entries for that column is displayed. By selecting one of the entries from the drop-down list, called a **filter criterion** you instruct Excel what to search for. Then Excel filters the list so that only the sets of data that contain the entry you selected will be displayed. When Filter mode is active, arrows for the columns with filter criterion selected appear in blue on the worksheet, row numbers appear in blue, and the status bar displays either the number of rows that meet the criteria, or the text “Filter mode.” The sets of data that do not meet the criteria remain in the list but they are hidden.

If you select a single cell in the list before choosing Filter drop-down list arrows are applied to all of the column labels in your list. If you select multiple column labels before choosing Filter drop-down list arrows are displayed only for the selected columns, thus restricting which columns you can apply filters to. In either case, the entire list is filtered. Also, you can filter only one list at a time on a worksheet.

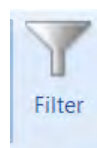
➤ **To filter a list using AutoFilter:**

Mouse

- e) Place the active cell anywhere within your list.
- f) Click the **FILTER** option from the **SORT & FILTER** button on the **HOME** ribbon in the **EDITING** group



OR

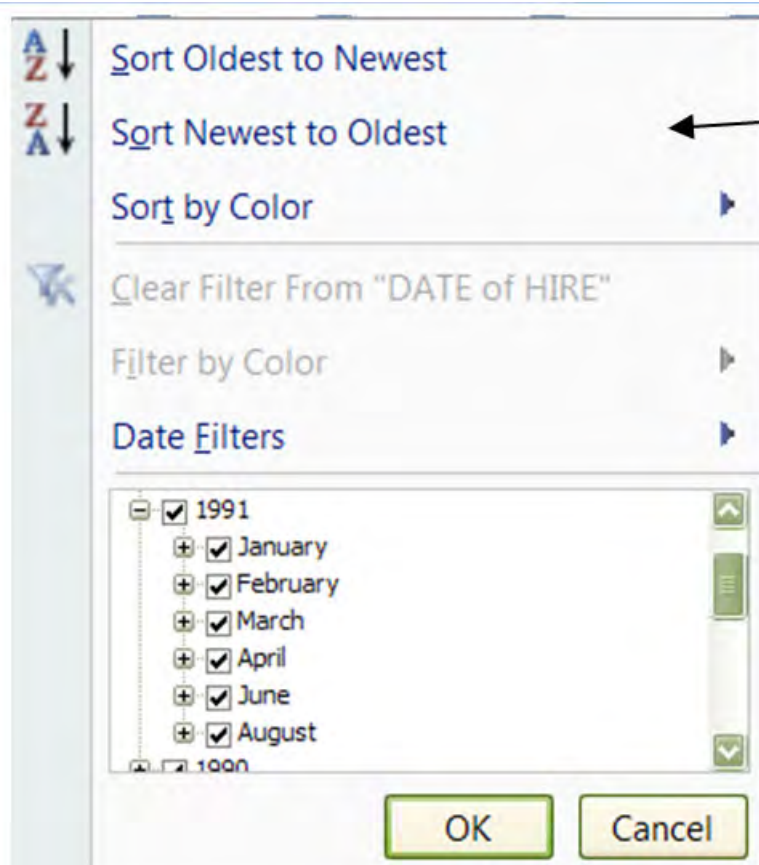


- a) Choose **FILTER**, button from the **DATA** ribbon, **SORT & FILTER** group.
- b) Your list column labels will appear with drop-down list arrows to the right.
- c) When you select the drop down arrow from the top of a particular column you will have (depending on the data type) a box at the bottom of the menu with all unique values make sure the values you wish to be seen are **ticked**. Select the values you are filtering for.(Following Pictures)
- d) When all values you wish to see are ticked (this creates OR conditions for that column) click OK to apply the filter for that column

OR

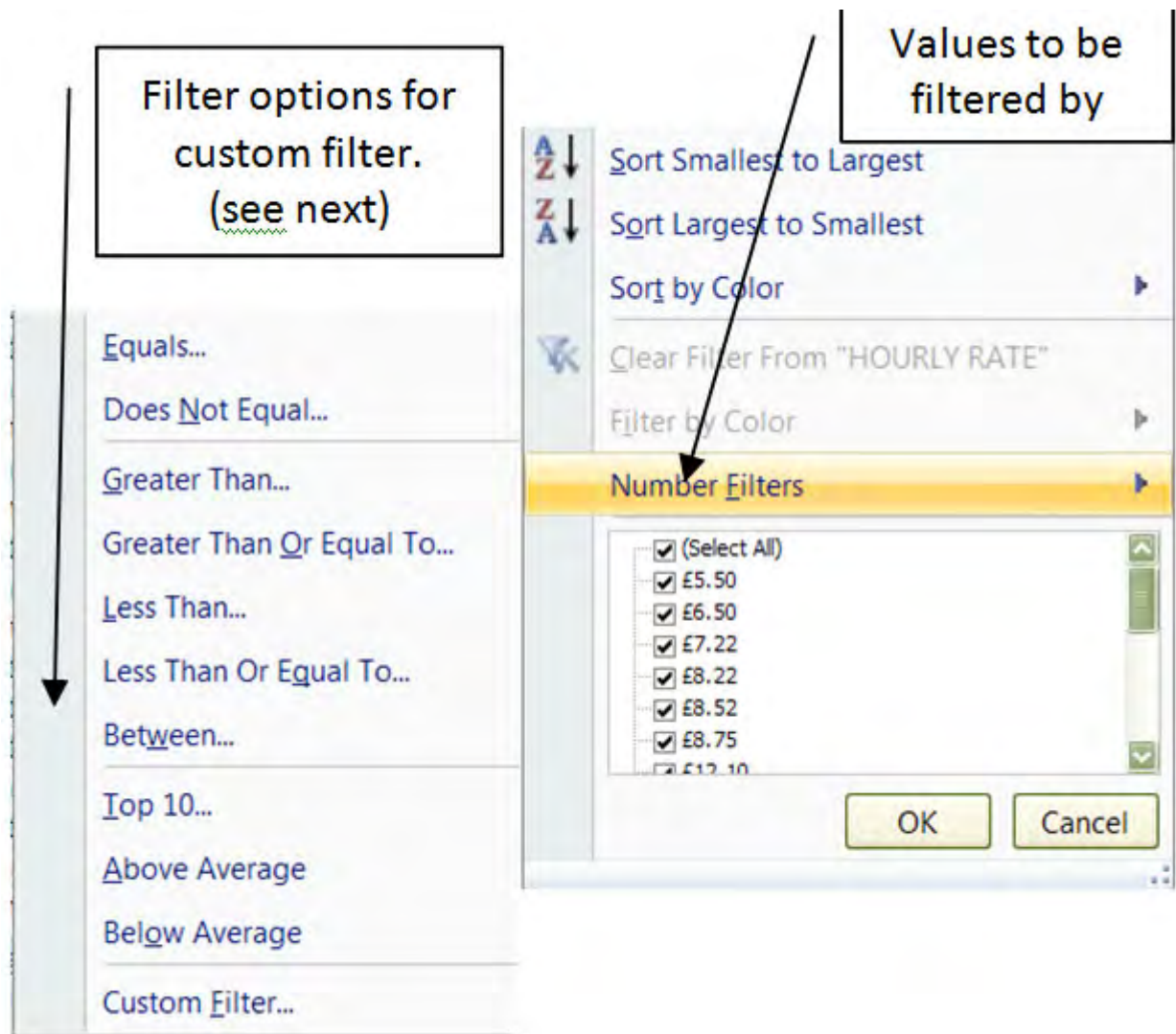
- i. You have sort order options at the top part of the menu which work in the same manner as previously discussed if you select a sort order this will close the menu and apply the filter.
- i. Repeat step 3 until you have set filter criteria for all columns that you wish to filter by.
- ii. The list will show only those rows that match your criteria.

	A	B	C	D	E	F	G
4	NUM	FIRST	LAST	DIVISION	DEPT	Risk	Month Of Hire
5	1	Sara	Kling	Germany	Water Rides	Medium	December
6	2	Sean	Willis	Great Britain	Water Rides	Medium	july
7	3	Colleen	Abel	Canada	Water Rides	Medium	july
8	4	Teri	Bingna	Australia	Water Rides	Medium	September



Sorting  
options





Each time you apply criteria to a column you create AND conditions across columns that reduce the number of records that will be displayed. Using the simple autofilter OR conditions cannot be applied across columns. (see advanced filter).  
More AND conditions = less records

Whilst a filter is active, if you print the worksheet, only visible rows will be output, so you can print out multiple views of your data from an individual list.

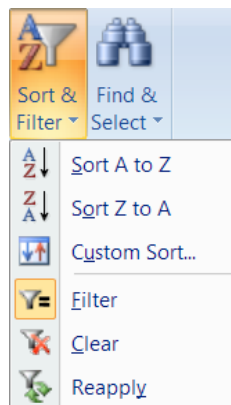
➤ **Removing a single column filter:**

Mouse

- You can see which columns have filter criteria active because the drop-down list arrows are blue. Click the drop-down list arrow for the column whose criteria you wish to remove. And choose the tick box that says select all.
- All values will be selected for display again. Either click OK or select new sort order to show all records.

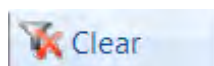
➤ **Removing all column filters:**

Mouse



- Click the Clear option from the **SORT & FILTER** button on the **HOME** ribbon in the **EDITING** group

OR



- Choose **FILTER**, button from the **DATA** ribbon, **SORT & FILTER** group.
- All column filters will be cleared

When filters are cleared the SELECT ALL tick box is applied to all columns. Make sure that this method is the one you really want if you have selected complicated criteria in a particular column.

## Custom Criteria

When you specify a filter criterion for a column from unique entries listed in the AutoFilter drop-down list, you can only select one filter criterion at a time. The Custom filter criterion enables you to filter a list to display sets of data that contain This creates an OR condition or complicated options of what text, dates or numbers you wish to display To meet the filter criteria, a set of data must meet either the first filter criterion or the second filter criterion or both

You can also use the Custom criterion choice to find values that fall within a range. When you specify custom criteria, select a comparison operator from the drop-down list and then either type in a value or select it from the criteria drop-down list.

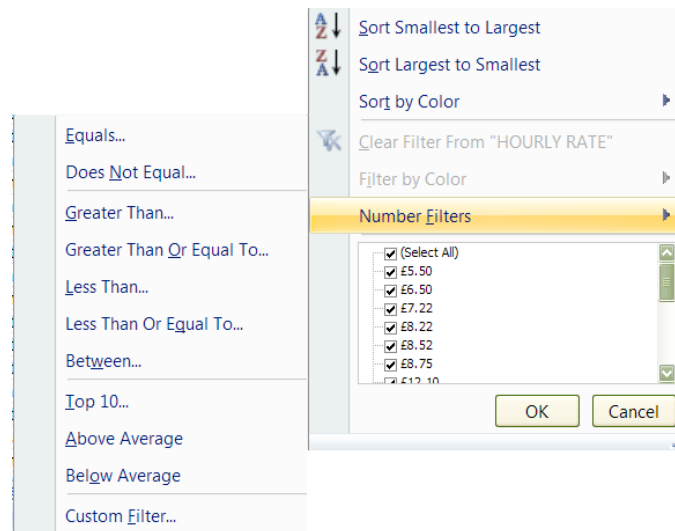
When you use custom criteria, you need to understand the comparison operators that Excel offers you. The table below outlines these:

Operator	Meaning
=	Equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to
<>	Not equal to

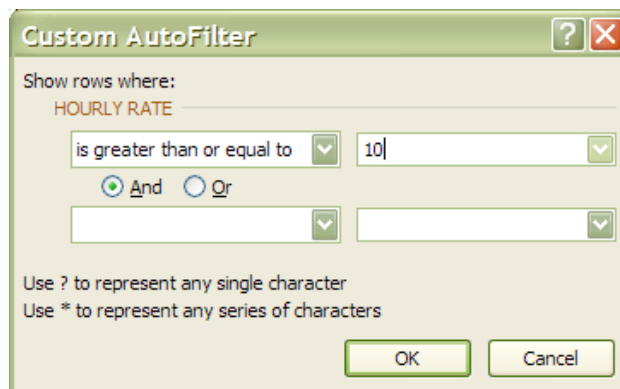


- To specify “either AND/OR” custom criteria:

### Mouse



- Click on the **AUTOFILTER** drop-down for the desired column.
- Depending on the Data type you will have the data type and type of filter name. (picture shows number filter)



- You may select one of the options shown to start your custom filter OR move to the bottom of the menu and select custom Filter.
- The following dialog box will be shown.
- In the Custom AutoFilter dialog box from the first criteria drop-down list select one of the filter criteria. (The default operator is = “equals”).
- Click on **OR** or **AND**. (this is very important)
- From the second operator drop-down list, select a comparison operator.
- From the second criteria drop-down list select the other filter criterion.

- i) Click **OK**. The filtered list shows the sets of data that meet either the first or the second specified criterion for the column.

➤ **Using custom criteria to find a range of values:**

Mouse

- a) Click the drop-down arrow for the column label whose range of values you want to filter by. This will typically be numbers or dates
- b) Click Custom filter. From the resulting dialog box, select the comparison operator to control the lower limiting value, for example greater than or greater than or equal to.
- c) From the first criteria drop-down list, select a value or type the value in.
- d) Select **AND** as the data **MUST** meet both conditions to display the range
- e) From the second criteria drop-down list select the other filter criterion.
- f) Click **OK**. The filtered list shows the sets of data that meet **BOTH** the first and the second specified criterion for the column.

### Wildcards

You can use wildcards to search for text in common within the unique entries, even though the entire entry might not match. For example, searching for all of the sets of data that have entries in the last-name column that begin with “M” might display two Moore’s (where the entire entry matches) but might also display Madding and Martinez (where the entire entry does not match).

Wildcard	Finds	Example
* asterisk	Any set of characters that are in the same position as the asterisk	*.xls finds Filter.xls and sortdata.xls
? question mark	Any single character that is in the same position as the ?	B?t finds Bat, Bit, But and Bet
~ tilde	A question mark or an asterisk	Who~? Finds the text “Who?”

➤ **To filter a list using wildcards:**

Mouse

- a) With AutoFilter active, select the drop-down list arrow to the right of the column you want to use to filter the data.

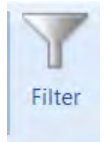
Wildcards only work when filtering columns containing text

- a) Choose **CUSTOM**.
- b) Ensure that the operator is set to =.
- c) Type the pattern of letters you are filtering by with the asterisks and/or question marks inserted in the appropriate positions.

- d) Click **OK**.
- e) Turning Off Autofilter

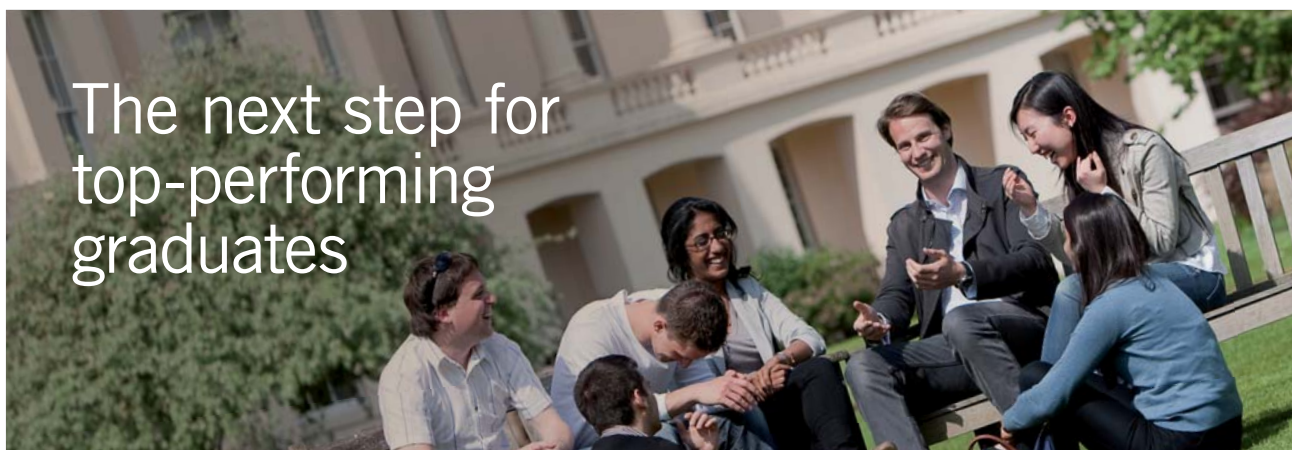
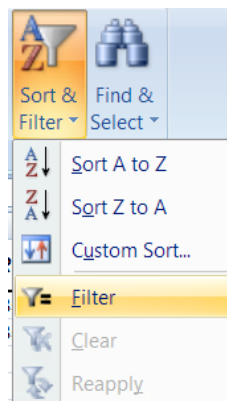
When you no longer need to filter your data, you can switch the AutoFilter off in the following way:

- To switch off AutoFilter:



#### Mouse

- a) Choose **FILTER**, button from the **DATA** ribbon, **SORT & FILTER** group.



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\* Figures taken from London Business School's Masters in Management 2010 employment report



**OR**

- a) Click the **FILTER** option from the **SORT & FILTER** button on the **HOME** ribbon in the **EDITING** group
- b) The AutoFilter option on the submenu will appear ticked showing that AutoFilter is currently active. Click AutoFilter to remove the tick and deactivate the AutoFilter.

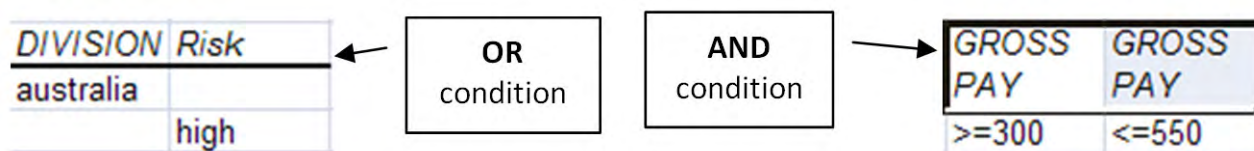
**Advanced Filtering**

Sometimes, the filter criteria that you specify with AutoFilter will not yield the necessary results. For example, you cannot use AutoFilter to filter a list to display the more complex criteria of two separate AND conditions combined with an OR condition. To do this, you must use the Advanced Filter option. This relies on you setting up and defining a Criteria range on the worksheet where the data to be matched can be entered.

**Set Criteria**

The Criteria range usually consists of a copied set of the list column names, and a blank row immediately beneath into which you can type the data to be matched. It is a good idea to copy the column names from the top of the database into the area to be used as a criteria range, as this reduces the chance of there being any discrepancy between the two sets of names.

In fact, not all the column labels need to be included in the criteria range. It could be restricted to only those labels on which you wished to search, and those labels included could be displayed in a different order. If you wish and criteria to create a range you may need to copy a particular column label twice.

**➤ To define the Criteria range:****Mouse**

- a) Copy across to a new sheet the column labels you wish to create criteria for.
- b) Create the criteria in the cells under the labels.
- c) If criteria are created in the same row, this would create an **AND** condition and on different rows this would create an **OR** condition.
- d) Select the copied set of column labels and the criteria below and name the cell range if you wish. (not essential) Type the word *Criteria* into the name box and press [ENTER].



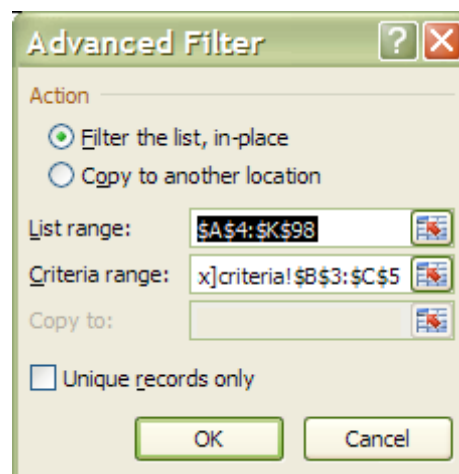
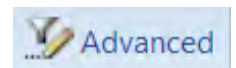
criteria			
	A	B	C
1			
2			
3		DIVISION	DEPT
4		canada	shows
5		australia	

*You do not have to name the cells with the range name Criteria, but it will ensure that Excel automatically picks the correct group of cells as the criteria carrying cells whenever you use the Advanced Filter.*

➤ To run an advanced filter:

#### Mouse

- Click within your data list
- Choose **ADVANCED**, button from the **DATA** ribbon, **SORT & FILTER** group.
- The following dialog will be displayed



- You should see that your data list is selected completely. If not (due to empty columns or rows.) Delete the values in the list range box and either type in the range you wish or select the correct range with the mouse
- In the criteria range box either type *criteria* (if you named the range) or delete any values present and select your criteria from your sheet of criteria.
- By default the list will be filtered in place as when using the AutoFilter.
- Click **OK**. You will be returned to your data list with the filter applied.
- Sort if needed

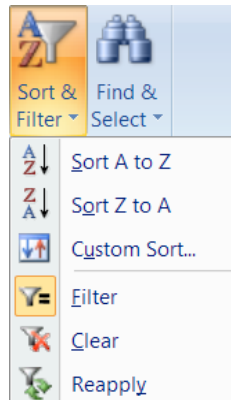


➤ **To remove a filter:**

Mouse

- a) Click the Clear option from the **SORT & FILTER** button on the **HOME** ribbon in the **EDITING** group

OR



- a) Choose **FILTER**, button from the **DATA** ribbon, **SORT & FILTER** group.

- b)  The filter will be cleared

## CHALLENGING PERSPECTIVES

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## Entering Search Criteria

At a basic level criteria entered in the Criteria range is subject to the limitations mentioned earlier but making use of a user defined Criteria range allows more complex searches to be performed.

It is important to remember to clear the old filter and select new criteria and delete old criteria from either the custom filter or the advanced filter before applying a new filter. Otherwise the true results of a filter will not be shown. For example, if the first filter is applied with Johnson entered under Surname, and a subsequent filter is carried out for those who work in Finance, it is essential that the Name specification is cleared unless you deliberately wish to confine the filter to those people called Johnson who happen to work in the Finance department.

Excel will find records matching text information entered in the Criteria range, and records where the initial letters match the specified data. When working with a user defined criteria range, if you wish to confine filter results to only those records where, for example, the first name is Rob, it would be necessary to enter the formula `=Rob` in the Criteria range under the appropriate column label.

Criteria Entered	Results Matched
Rob or Rob*	Rob; Robert; Robin
<code>=Rob</code>	Rob

## Wildcards With Text Criteria

One variation on searches for text criteria consists of using text Wildcard symbols. The two Wildcard symbols may be familiar to users of other PC systems.

### The Asterisk

The Asterisk (\*) may be substituted for any group of characters. Searching for \*Banking would find both Development Banking and Merchant Banking. If no Wildcard symbols are included in the search criteria, Excel usually assumes that there is an asterisk at the end of the specification, so it will match the data specified and any records where the initial data is the same.

### The Question Mark

The Question Mark (?) may be substituted for any single character. The question mark identifies the position of the wildcard character within the string of text. T?m would find Tim or Tom. ?a would find all records where the second letter in the appropriate field was an A. Once again, Excel will assume that there is an asterisk on the end of the search specification unless otherwise informed. Entering T?m in a Firstname field would find Tim, Tom and Tommy. Use the syntax `=T?m` to confine the searches to three characters in length.

## Multiple Criteria

Hitherto, the Criteria range has been described as a copied set of field names into which you may enter search specifications under the appropriate column names. You may choose to enter criteria in the blank row under more than one field name. Entering Finance as the department and 7 as the grade for example, would find only those persons who met both criteria.

Multiple criteria on the same row dictates that the first specification AND all other specifications must be met in order for Excel to find the record. (See also use of the AND() function under Calculated Criteria).

### Using Multiple Rows in the Criteria Range

DIVISION	Risk
australia	
	high

There may be situations where you wish to find members of either Division or Risk. In such an instance the Criteria range can be extended to include a second row into which you may enter specifications:

#### ➤ Extending the criteria range for OR criteria:

### Mouse

- If you named your criteria range then you may wish to first delete the current *Criteria* range name. choose **NAME MANAGER** from the **FORMULAS** ribbon. In the **DEFINED NAMES** group.
- Select **CRITERIA** from the names list inside the dialog and click **DELETE**.
- Close the dialog box
- Create your criteria on your criteria worksheet as necessary. Now, entering search specifications in all rows within the range will allow Excel to identify all those records which meet the specifications in either, the first OR the second row etc. (See also use of the OR() function under Calculated Criteria).
- Highlight the entire region to be redefined as the Criteria range - i.e. the copied set of Column names and the two rows (or more) immediately below, then, Name the range again if you wish. (if previous named criteria are still present then ensure a different name is used to identify this criteria.).
- Apply advanced filter as previously discussed.

*The Criteria range may be extended to include three or more rows of user defined search criteria if required.*

*To return to using just one row of user defined information in the Criteria range, select the area to be included and redefine the Criteria range again. This is important because searching for data when a row in the Criteria range has been left blank, will result in Excel finding every record in the database. In effect, you have asked Excel to find all records where the contents of any field can be anything at all.*

## Checking The Criteria Range

If you are getting surprising results when you filter your data, it may be because your criteria range contains unlabelled cells or extra rows that you thought you had removed from the range.

It is easy to double check the currently defined Criteria range at any time by making use of the range name which Excel applies to it. Using the [F5] function key will result in a dialog box showing all the currently named ranges on the worksheet. Click on the name Criteria and choose **OK**. The area covered by that name will be highlighted. You may choose to alter the selection and redefine the Criteria range again to adjust it.

## Calculated Criteria

You may also choose to find data subject to calculated criteria rather than exactly matching data or using comparison operators or wildcard characters. This would let you find data that matches the result of a formula, rather than a value that you have entered directly

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➤ **To use calculated criteria:**

Mouse

- Include in the Criteria range one column name which is not used in the list - Calc for example.
- Delete any named criteria from the **NAME MANAGER**
- Select the column labels (including *Calc* or whatever you have named it) plus at least one row below them depending on whether you need use multiple OR conditions to filter your data.
- Type *Criteria* into the Name box and press [ENTER] to name the range

Below the calculated fieldname in the criteria range, you must enter a formula which refers to the cells contained in the first record of the database. The formula must result in a TRUE or FALSE answer.

NUM	FIRST	LAST	DIVISION	DEPT	Risk	Month Of Hire	DATE of HIRE	HRS	HOURLY RATE	GROSS	calc
											=L20*1.1>500

In the example below, in order to find only those records where the value of the gross for Australia would increase to over 500 a 10% increase was applied, the formula shown could be entered in the *Calc* column.

NUM	FIRST	LAST	DIVISION	DEPT	Risk	Month Of Hire	DATE of HIRE	HRS	HOURLY RATE	GROSS	calc
											FALSE

When entered, the calculated formula displays on the worksheet as TRUE or FALSE depending on the figures contained in the first record of the database to which the formula specifically refers. The underlying formula displays in the formula bar as usual.

You may use calculated fields to refer to and manipulate cells within the first record of the database, and to refer to cells outside of the database area. For example, the threshold figure of 500 might be held in an input cell outside the database. If this was the case, that cell reference could be included in the calculated search criteria, but the reference to it would need to be absolute or fixed.

### Calculated Criteria Using Functions

Some of Excel's Logical Functions are particularly suited to setting Criteria for a list search. Rather than having to extend the criteria range, you can specify criteria as arguments within the AND(), OR() or NOT() functions.

=AND()

If there are several specifications, every one of which must be met by all records found, use the AND() function and refer once again to the cells contained in the first record of the database. Text entries must be enclosed in double quotes. The AND() function may contain up to 30 comma separated arguments

LOOKUP												
	E	F	G	H	I	J	K	L	M	N	O	P
1	DIVISION	DEPT	Risk	Month Of Hire	DATE of HIRE	HRS	HOURLY RATE	GROSS	calc			
2									=AND(E2="australia",G2="medium",L2>=400)			

Referring to the database in the diagram below, for example, if the **GROSS** (L2) must be greater than or equal to 400, the **DIVISION** (E2) Australia and the **RISK** (G2), medium. The calculated function might be set as appears on the Formula bar:

=OR()

Searching for two different entries in the same field would necessitate the use of the OR() function. You may wish to locate all the records where the **DEPT** (F2) is either shows or water rides. Obviously the AND() function will be inappropriate, because the customer cannot be both companies simultaneously. Instead, the calculation might be:

LOOKUP												
	E	F	G	H	I	J	K	L	M	N	O	
1	DIVISION	DEPT	Risk	Month Of Hire	DATE of HIRE	HRS	HOURLY RATE	GROSS	calc			
2									=OR(F2="shows",F2="Water Rides")			

Excel will find any records where any one of the arguments contained in the OR() function is met. The OR() function may contain up to 30 comma separated logical arguments.

=NOT()

The NOT() function can be used to exclude records meeting certain criteria from the find operation. Entering a calculation such as:

=NOT(DIVISION="Canada")

will allow Excel to find all those records where the Division is anything other than Canada. The NOT() function contains only one argument. It can be combined with other functions, for example:

=AND(NOT(DIVISION="Canada"),Hrs<20)

will find all those records for divisions other than Canada where the Hrs worked was less than 20.



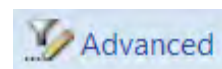
## Copying Filtered Data

You can use the Advanced Filter command to copy the sets of data that meet the criteria in the Criteria range to another location on the worksheet.

### ➤ To copy filtered data to another location:

#### Mouse

- Set the Criteria range.
- Place the active cell within the list.
- Choose **ADVANCED**, button from the **DATA** ribbon, **SORT & FILTER** group.
- In the resulting dialog box, choose Copy to Another Location.
- In the Copy To text box, enter a worksheet cell that represents the top left-hand corner of where you would like the results.
- Click **OK**.



Data copied to here

	A	B	C	D	E	F	G	H	I	J	K
101											
102		<b>GROSS</b>	<b>GROSS</b>								
103		<b>&gt;=300</b>	<b>&lt;=550</b>								
104											
105	<b>NUM</b>	<b>FIRST</b>	<b>LAST</b>	<b>DIVISION</b>	<b>DEPT</b>	<b>Risk</b>	<b>Month Of Hire</b>	<b>DATE of HIRE</b>	<b>HRS</b>	<b>HOURLY RATE</b>	<b>GROSS</b>
106	41	Kathy	Mayron	Great Britain	Adult Rides	High	May	19-May-86	40	£8.22	£328.80
107	60	Edward	Trelly	Australia	Children's Rides	Low	June	17-Jun-86	40	£8.75	£350.00
108	22	Jacqueline	Banks	Australia	Shows	None	february	02-Feb-84	40	£8.75	£350.00
109	36	Peter	Allen	Australia	Water Rides	Medium	May	31-May-86	40	£8.75	£350.00
110	4	Teri	Binga	Australia	Water Rides	Medium	September	07-Jun-88	40	£8.75	£350.00
111	71	Maria	Switzer	Germany	Children's Rides	Low	June	03-Jun-91	29.5	£13.30	£392.35
112	32	James	Abel	Great Britain	Children's Rides	Low	february	05-Feb-91	35	£12.10	£423.50
113	64	Lynne	Simmons	Australia	Children's Rides	Low	November	23-Nov-88	35	£12.10	£423.50
114	69	Shirley	Dandrow	Canada	Children's Rides	Low	march	14-Mar-91	35	£12.10	£423.50

*If you want to copy only certain columns from the matching sets of data, enter the column labels exactly as they appear in the list in the location you want to copy to. When you run the filter, set the Copy To range reference to the cells where you have typed the column labels. You may only use this on the sheet your data is on you cannot copy to another sheet that will have to be done manually later.*

## Unique Records

There is a check box [a]allowing you to select Unique records only. This may be useful if, for example, the Copy To range does not include all the column labels. There may be several records where the division and last name are the same. If the Hourly rate, hrs, Date of hire fields etc are not included in the Copy To range, this could result in several seemingly identical records being extracted. Checking the Unique records only check box before choosing **OK** would result in Excel extracting only the first record in each instance.

## 3.5 List Statistics

There are several Excel functions which are specifically designed to enable you to analyse database information. A selection of these appears in the table below.

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## Database Functions

Function	Purpose
DCOUNT(Database,Field,Criteria)	To count the number of records in a list which meet specified criteria. This function will only count value cells.
DCOUNTA(Database,Field,Criteria)	To count the number of records in a list which meet specified criteria. This function includes text and value cells.
DSUM(Database,Field,Criteria)	To add the contents of the chosen field in a list, subject to any specified criteria.
DMIN(Database,Field,Criteria)	To find the minimum value in the chosen field in a list, subject to any specified criteria.
DMAX(Database,Field,Criteria)	To find the maximum value in the chosen field in a list, subject to any specified criteria.
DAVERAGE(Database,Field,Criteria)	To find the average value of the chosen field in a list, subject to any specified criteria.
DGET(Database,Field,Criteria)	To return the contents of the chosen field subject to any specified criteria. This function is only valid where a single record meets the criteria set.
DPRODUCT(Database,Field,Criteria)	To multiply the contents of the chosen field in a list, subject to any specified criteria.

In all cases, if the Criteria range is blank, these functions will apply to the entire list area. Once data is entered in the Criteria range, the results of the Database functions will adjust to reflect only those records meeting the criteria.


The arguments for all of these functions are identical, and the easiest way to incorporate them into a worksheet is by using the Paste Function dialog.

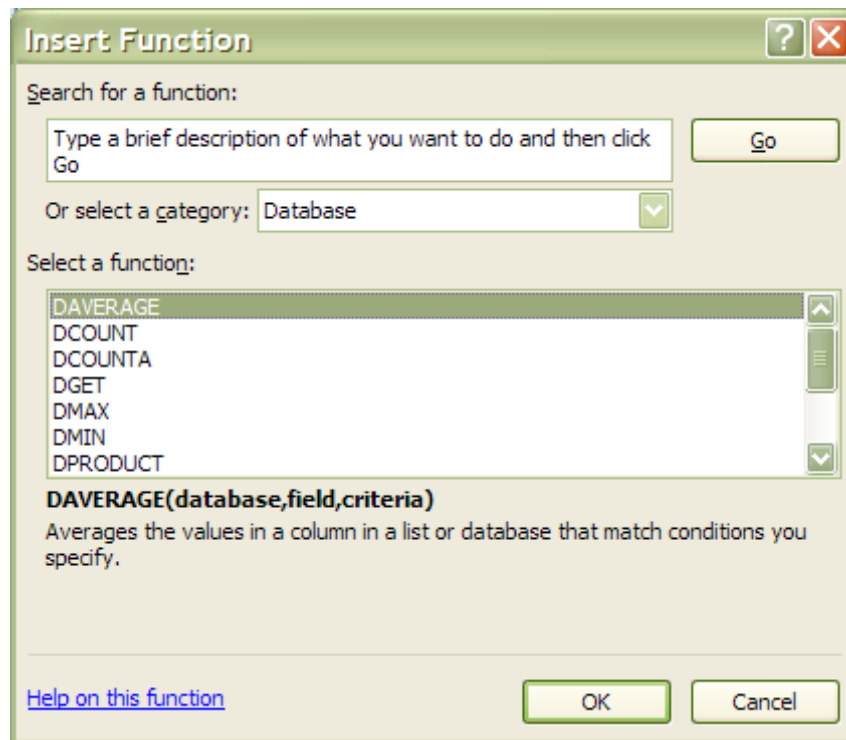
- To enter a database function on the worksheet:

Mouse

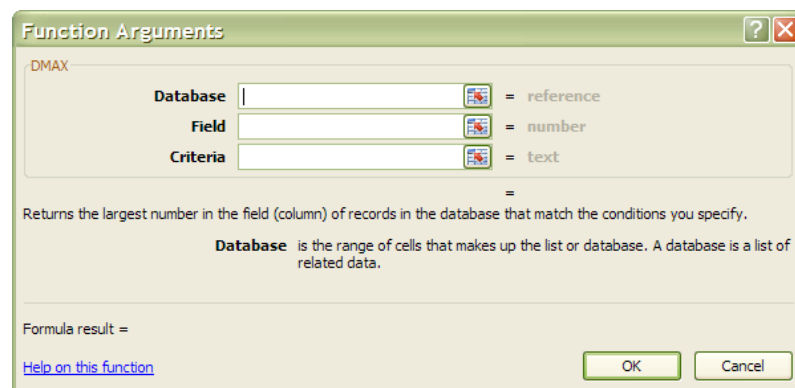
- a) Click the **INSERT FUNCTION** button from **FORMULA LIBRARY** on the **FORMULAS** ribbon

OR

- a)  Click the **INSERT FUNCTION** button from the left hand side of the **FORMULA BAR**.
- b) The following dialog box will appear



- c) In the function category list, select Database.
- d) From the function name list choose the database function you require: e.g.=DMAX()



- e) Click **OK** another dialog will appear.
- f) Enter the three arguments, list range, field name and criteria range.
- g) Press [ENTER] or click **OK**

D3      fx      =DMAX(A7:M101,M7,criteria!C10:C11)								
	A	B	C	D	E	F	G	H
1								
2								
3		max gross pay for canada		880				
4		High risk australians		4				
5								
6								
7	NUM	FIRST	LAST	EMP#	DIVISION	DEPT	Risk	Month Hir
8	1	Sara	Kling	GW29	Germany	Water Rides	Medium	Decem
9	2	Sean	Willis	GBW09	Great Britain	Water Rides	Medium	July
10	3	Colleen	Abel	CW58	Canada	Water Rides	Medium	July
11	4	Teri	Binga	AW55	Australia	Water Rides	Medium	Septem
12	5	Frank	Culbert	GBC07	Great Britain	Children's Rides	low	June

In the above example, the formula shown on the formula bar above has been entered into the cell to the right of the label “Max gross pay for Canada.” This formula finds the maximum gross pay for all records where the division is Canada. All the database functions look at what has been entered in the criteria range in order to give their results.

If you have assigned the range name **DATABASE** to your **LIST AREA** and **CRITERIA** to your criteria range you use can [F3] to paste the names.

The field may be entered as a number or as text. Obviously, if the field on which the function is to operate is the fifth column within the database, you could enter the number 5 as the field argument. Alternatively, the field name could be entered as text, in which case it would need to be enclosed in double quotes:

**=DMAX(database,"division",criteria)**

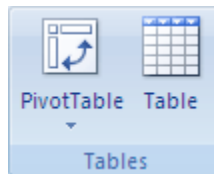
### 3.6 Pivottables

A PivotTable can summarise large amounts of data using specified calculations and formats. It is called a PivotTable because the headings can be rotated around the data to view or summarise it in different ways.

- The source data can be:
- An Excel worksheet database/list or any range that has labelled columns.
- A collection of ranges to be consolidated. The ranges must contain both labelled rows and columns.
- A database file created in an external application such as Access or Dbase.
- The data in a PivotTable cannot be changed as it is the summary of other data. The data itself can be changed and the PivotTable recalculated. The PivotTable can be reformatted.

- To create a PivotTable or PivotTable with pivot chart:

Mouse



- Select a cell in a range of cells of data, or put the insertion point inside of an Excel table.
- Make sure that the range of cells has column headings.
- Do one of the following: To create a PivotTable report, on the **Insert** ribbon, in the **Tables** group, click **PivotTable**, and from the menu click **PivotTable**.
- The **Create PivotTable** dialog box is displayed.

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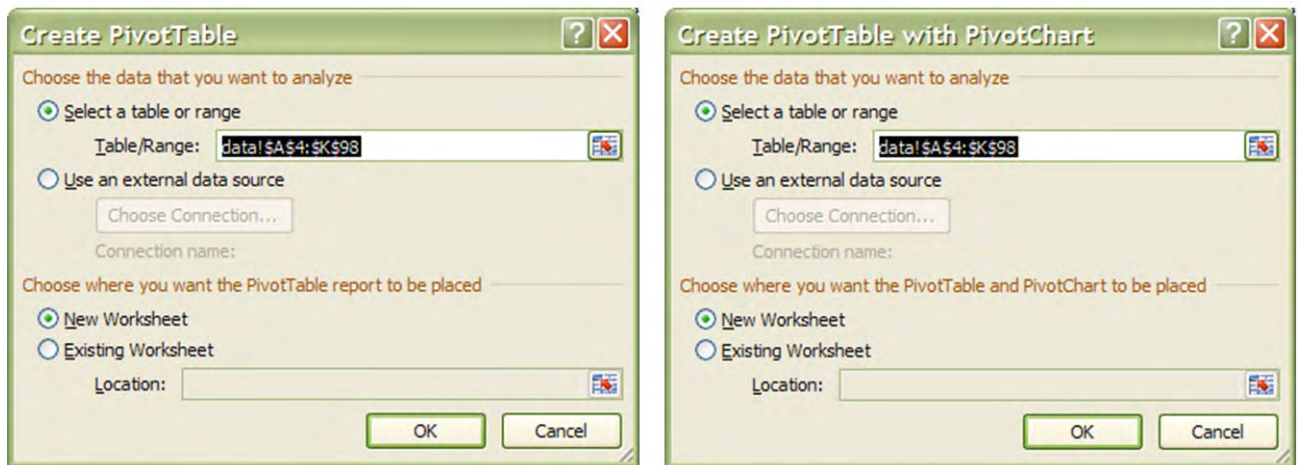
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### OR

- To create a PivotTable and PivotChart report, on the **Insert** ribbon, in the **Tables** group, click **PivotTable**, and then from the menu click **PivotChart**.
- The **Create PivotTable with PivotChart** dialog box is displayed.

### ➤ To Select a data source. And choose the data that you want to analyze

#### Mouse

- Click **Select a table or range**.
- Type the range of cells or table name reference, such as =QuarterlyProfits, in the **Table/Range** box.
- If you selected a cell in a range of cells or if the insertion point was in a table before you started the wizard, the range of cells or table name reference is displayed in the **Table/Range** box.

### OR



- To select a range of cells or table, click **Collapse Dialog button** to temporarily hide the dialog box, select the range on the worksheet and then press **Expand Dialog**.

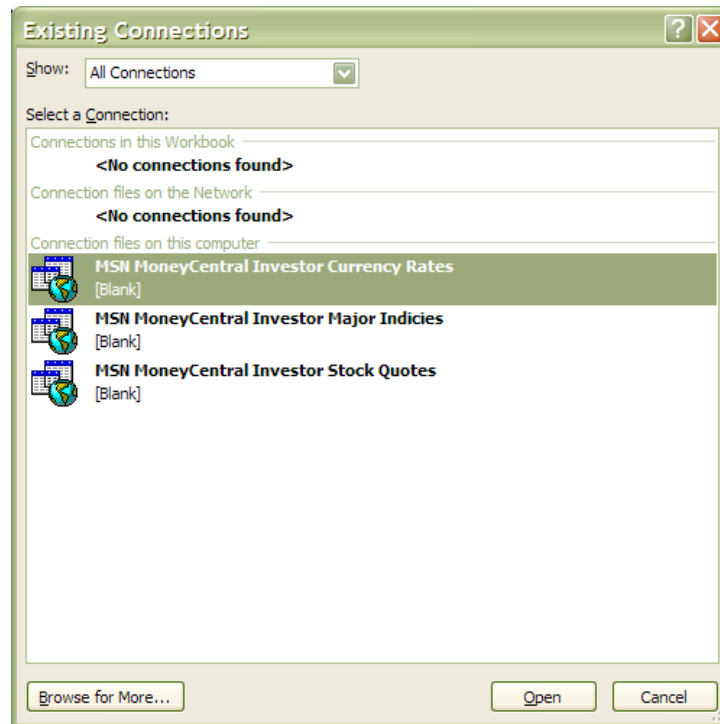
*If the range is in another worksheet in the same workbook or another workbook, type the workbook and worksheet name by using the following syntax:*

*([workbookname]sheetname!range).*

➤ Use external data

Mouse

- a) Click Use an external data source.
- b) Click Choose Connection.



- c) The Existing Connections dialog box is displayed.
- d) In the **SHOW** drop-down list at the top of the dialog box, select the category of connections for which you want to choose a connection or select **ALL CONNECTIONS** (which is the default).
- e) Select a connection from the **SELECT A CONNECTION** list box, and then click **OPEN**.

*If you choose a connection from the Connections in this Workbook category, you will be reusing or sharing an existing connection. If you choose a connection from the Connection files on the network or Connection files on this computer the connection file is copied into the workbook as a new workbook connection, and then used as the new connection for the PivotTable report.*

➤ **To Enter a location.**

Mouse

- To place the PivotTable report in a new worksheet starting at cell A1, click **NEW WORKSHEET**.
- To place the PivotTable report in an existing worksheet, select **EXISTING WORKSHEET**, and then type the first cell in the range of cells where you want to locate the PivotTable report.

OR

- click **COLLAPSE DIALOG** to temporarily hide the dialog box, select the beginning cell on the worksheet and then press **EXPAND DIALOG**.
- Click **OK**.



An empty PivotTable report is added to the location that you entered with the PivotTable Field List displayed so that you can start adding fields, creating a layout, and customizing the PivotTable report.

If you are creating a PivotChart report, an associated PivotTable report is created directly underneath the PivotChart report for the location that you enter. This PivotTable report must be in the same workbook as the PivotChart report. If you specify a location in another workbook, the PivotChart report will also be created in that workbook.

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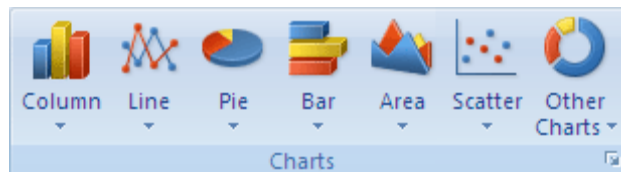
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## To Create A PivotChart Report From An Existing PivotTable Report

### Mouse



- a) Click the PivotTable report.
- b) On the **INSERT** ribbon, in the **CHARTS** group, click a chart type.

You can use any chart type except xy (scatter), bubble or stock.

### ➤ **Convert a PivotChart report to a static chart**

Find the associated PivotTable report that has the same name as the PivotChart report by doing the following: (The PivotTable report that supplies the source data to the PivotChart report. It is created automatically when you create a new PivotChart report. When you change the layout of either report, they both change.)

### Mouse

- a) Click the PivotChart report to find the associated PivotTable report name, In the **DATA** group, on the **DESIGN** ribbon, click **SELECT DATA** to display the **EDIT DATA SOURCE** dialog box, and then note the associated PivotTable name, which is the text that follows the (!) exclamation point, in the Chart data range text box and then click **OK**.
- b) To identify the associated PivotTable report, click each PivotTable report in the workbook, and then on the **OPTIONS** ribbon, in the **PIVOTTABLE** group, click **OPTIONS** until you find the same name in the **NAME** text box. then Click **OK**.
- c) On the **OPTIONS** ribbon, **ACTIONS** group, click **SELECT**, then click **ENTIRE PIVOTTABLE**. Press **DELETE**.
- d) The chart is now static and not associated with the PivotTable.



## Create A Static Chart From The Data In A PivotTable Report

This procedure creates a regular, noninteractive chart rather than a PivotChart report (PivotChart report: A chart that provides interactive analysis of data, like a PivotTable report. You can change views of data, see different levels of detail or reorganize the chart layout by dragging fields and by showing or hiding items in fields.).

### ➤ To create static chart from data

#### Mouse

- a) Select the data in the PivotTable report that you want to use in your chart. To include field buttons (A field button is a Button that identifies a field in a PivotTable or PivotChart report. You can drag the field buttons to change the layout of the report, or click the arrows next to the buttons to change the level of detail displayed in the report.) and data in the first row and column of the report, start dragging from the lower-right corner of the data that you're selecting.
- b) On the **HOME** ribbon, in the **CLIPBOARD** group, click **COPY**.
- c) Click a blank cell outside of the PivotTable report.
- d) On the **HOME** ribbon, in the **CLIPBOARD** group, click the arrow next to **PASTE**, and then click **PASTE SPECIAL**.
- e) Click **VALUES**, and then click **OK**.
- f) On the **INSERT** ribbon, in the **CHARTS** group, click a chart type.



## Delete A PivotTable Or PivotChart Report

### ➤ To Delete a PivotTable report

#### Mouse

- a) Click the PivotTable report.
- b) On the **OPTIONS** ribbon, in the **ACTIONS** group, click **SELECT**, and then click **ENTIRE PIVOTTABLE**.
- c) Press **DELETE**.

Deleting the associated PivotTable report (associated PivotTable report: The PivotTable report that supplies the source data to the PivotChart report. It is created automatically when you create a new PivotChart report. When you change the layout of either report, the other also changes.) for a PivotChart report creates a static chart that you can no longer change.

➤ **To Delete a PivotChart report**

Mouse

- a) Select the PivotChart report.
- b) Press **DELETE**.

Deleting the PivotChart report does not automatically delete the associated PivotTable report.

**Create Layout For PivotTables**

**PivotTable Field List**

Choose fields to add to report:

- ☐ NUM
- ☐ FIRST
- ☐ LAST
- ☒ **DIVISION**
- ☒ **DEPT**
- ☐ Risk
- ☒ **Month Of Hire**
- ☐ DATE of HIRE
- ☐ HRS
- ☐ HOURLY RATE
- ☒ **GROSS**

Drag fields between areas below:

<p>Report Filter</p> <p>DEPT</p>	<p>Column Labels</p> <p>DIVISION</p>
<p>Row Labels</p> <p>Month Of Hire</p>	<p>Values</p> <p>Sum of GROSS</p>

☐ Defer Layout Update Update

Once the PivotTable has been created a layout has to be created to view your data in the empty PivotTable we do this through the PivotTable Field list which appears in a pane to the right of your PivotTable

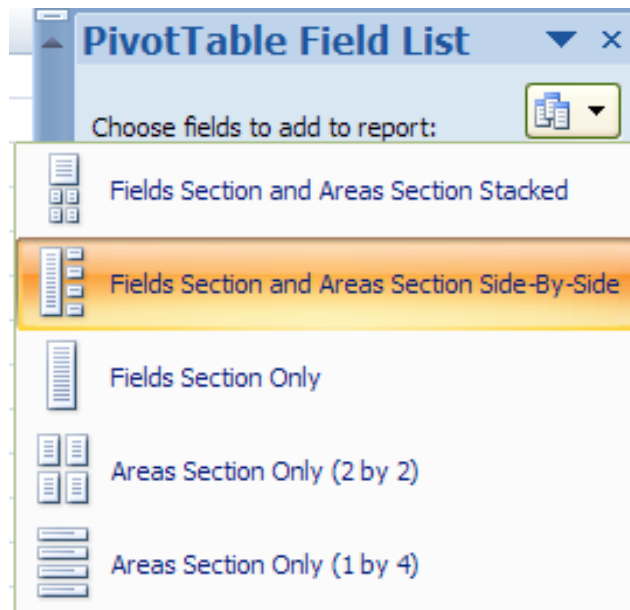
An Option button will allow you to change the way your PivotTable field list looks



➤ **To create a layout**

Mouse

- a) Drag and drop the fields from the fields section at the top to the bottom areas of the Pane
- b) If Month of Hire is used as a row label the PivotTable will look at your data and pick out the unique values to make up the row headings within your report.
- c) Choose a field for the column labels
- d) Choose a field you wish to use as your values.



Numerical data will use SUM as the default method of calculating your data. If Textual it will use count as default. You may use more than one field in any area but it is important to place them correctly. You may drag them around as much as you wish until your report looks as you wish it to look.

a) You may filter on one or more fields if you wish. To do this drag a field to the report filter box  
Any of these areas can be filtered.

### Modifying A PivotTable

- All of the following are options for modifying your PivotTable
- Adding or deleting fields
- filtering and sorting
- Format the colour scheme
- Changing how the pivot chart calculates

The screenshot shows an Excel PivotTable with the following data:

Row Labels	Australia	Canada	Germany	Great Britain	Grand Total
January	860		2369.75	840	4069.75
February	1674	895.65		925.3	3494.95
March	280.55	1775.65	780	840	3676.2
April	1444.75	389	1120	589	3542.75
May	350	1469	651	830.6	3300.6
June	950	802	392.35	1848	3992.35
July	600	703.5	1063.75	732.15	3099.4
August	860	352	494.125	2781.15	4487.275
September	450.75		191.75		5
October	860	600	1380		5
November	1043.5		4180.55		5
December	1550.75		1939.25		9
<b>Grand Total</b>	<b>10924.3</b>	<b>6986.8</b>	<b>14562.525</b>		<b>5</b>

The PivotTable Field List task pane on the right shows the following configuration:

- Choose fields to add to report:**
  - ☐ NUM
  - ☐ FIRST
  - ☐ LAST
  - ☒ DIVISION
  - ☒ DEPT
  - ☐ Risk
  - ☒ Month Of Hire
  - ☐ DATE of HIRE
  - ☐ HRS
  - ☐ HOURLY RATE
  - ☒ GROSS
- Drag fields between areas below:**
  - Report Filter:** DEPT
  - Column Labels:** DIVISION
  - Row Labels:** Month Of Hire
  - Values:** Sum of GROSS
- ☐ Defer Layout Update
- Update**

➤ **To Add or delete fields:**

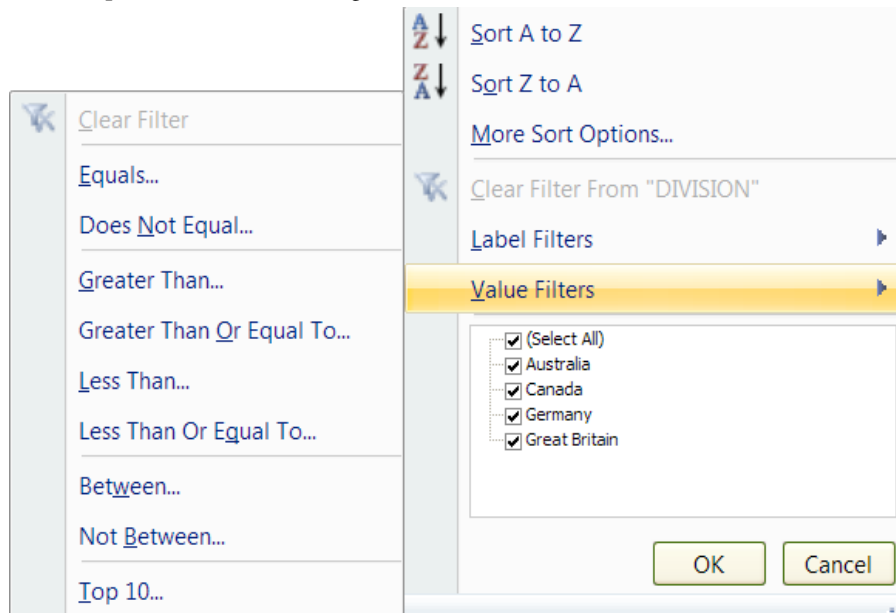
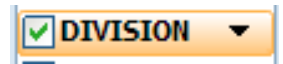
#### Mouse

- Drag and drop the fields between the various areas and the field list section field info will disappear or appear in different locations.
- Dragging a field from one of the areas to the field list will remove that data from the report.( this will not change the data in your Data list merely leave it absent from the report.

➤ **To sort a report:**

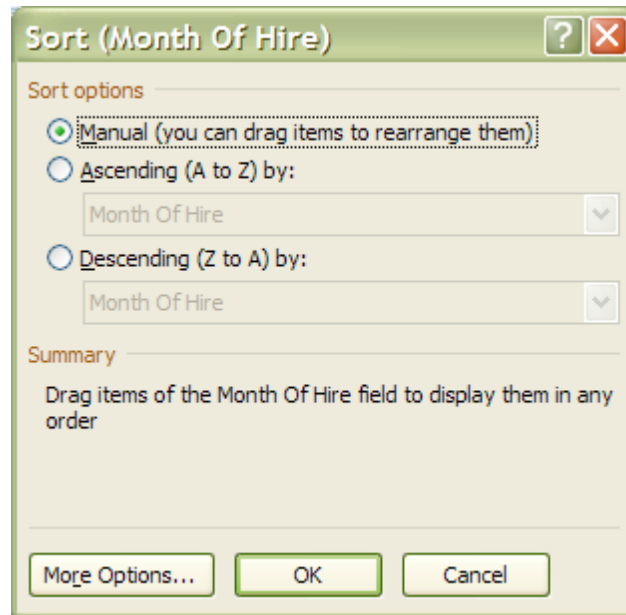
Mouse

- Move your mouse over a field that is ticked in the field list section
- Click on the drop down arrow to the right of the selected field



- Untick any values you don't wish to see this will remove those values as column labels within the report.
- SORT** your data Ascending or descending
- Click **OK**

OR



- Click on **MORE SORT OPTIONS**
- The following dialog appears.
- By default you may drag labels on your report to be in any order you wish.



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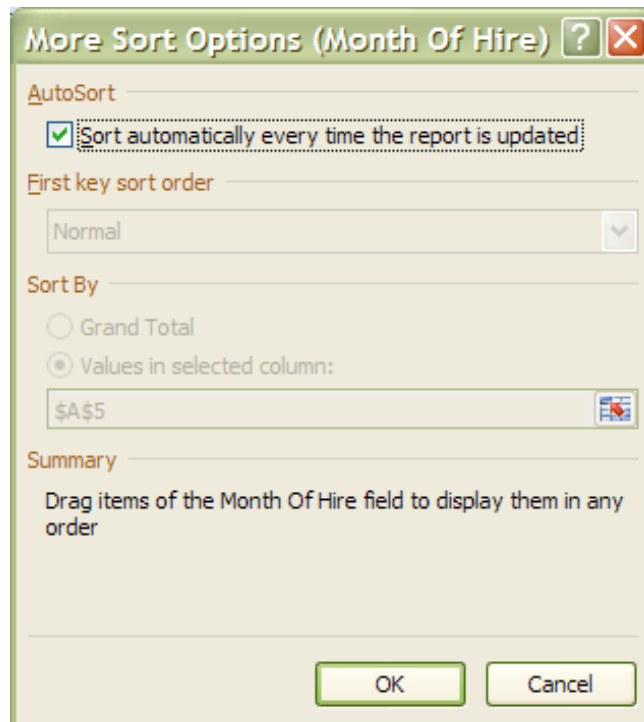


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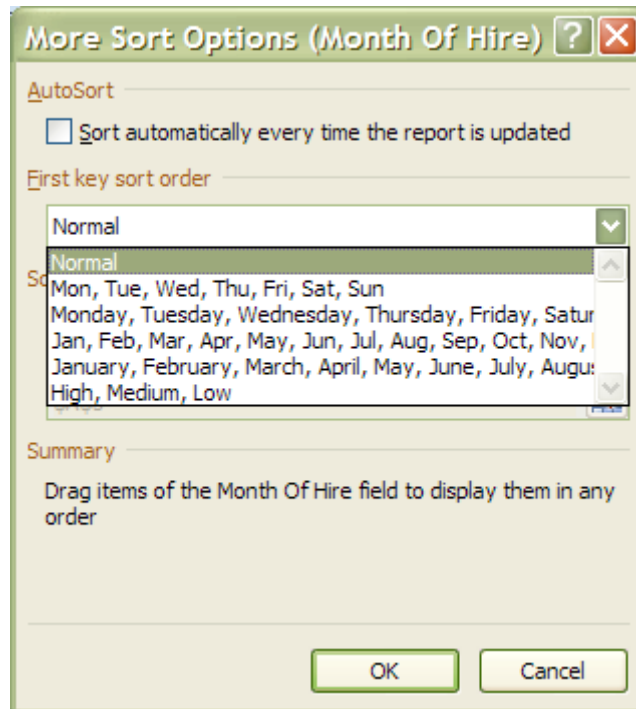
- d) Make an ascending or descending choice and by what field (this may be the field you originally started this process from or the Value field (E.G. Sum Of Gross))
- e) Click **OK**.

**OR**

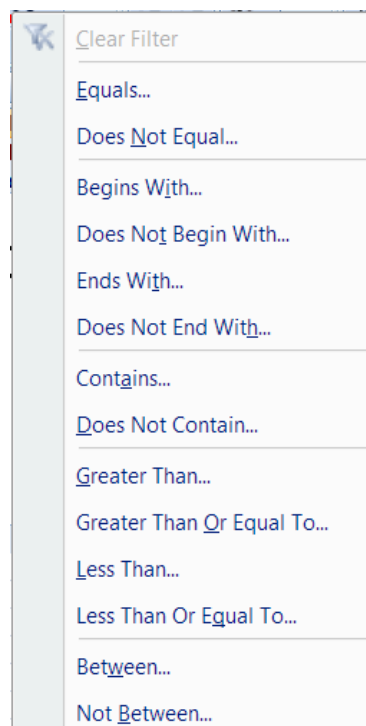
- a) click on **MORE OPTIONS**
- b) The following dialog appears



By default the report will sorted each time you update the report. If this box is unticked then you are allowed to sort by a specific key sort order as when we created custom sort orders previously. (see following picture.)



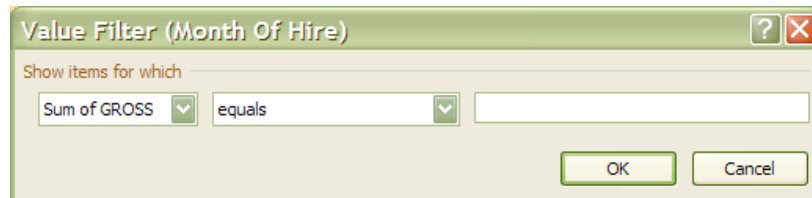
➤ To filter a report





Mouse

- Move your mouse to **LABEL** or **VALUE FILTERS** to see certain options to filter out your data
- Selecting a filter brings up the following dialog box the value is obviously **SUM OF GROSS** you may decide whether it is supposed to be equal to or greater than.

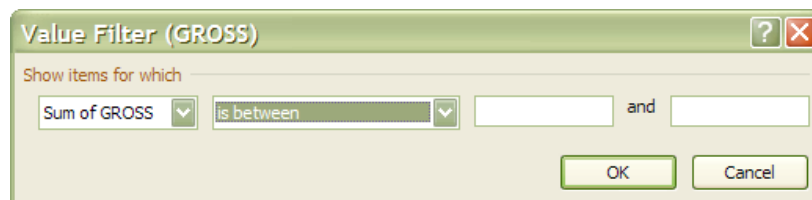


Value Filter (Month Of Hire)

Show items for which

Sum of GROSS equals

OK Cancel



Value Filter (GROSS)

Show items for which

Sum of GROSS is between and

OK Cancel

- Type in the value (or values) you will compare the condition against and Click **OK**



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*You may decide to filter your data more thoroughly there are two kinds of filters VALUE and LABEL filters Label filters will remove labels based on criteria rather than the tickboxes just discussed. And the Value filters will hide the data values and leave the labels showing. Both are completed the same way as Previously discussed in the filtering section.*

## 3.7 Managing Pivottables

When data is changed in the PivotTable source list, the PivotTable does not automatically recalculate.

### Using Another PivotTable Report

#### **The PivotTable cache.**

Each time that you create a new PivotTable report or PivotChart report, Excel stores a copy of the data for the report in memory, and saves this storage area as part of the workbook file. Thus, each new report requires additional memory and disk space. However, when you use an existing PivotTable report as the source for a new report in the same workbook, both reports share the same copy of the data. Because you reuse the same storage area, the size of the workbook file is reduced and less data is kept in memory.

#### **Location requirements**

To use a PivotTable report as the source for another report, both reports must be in the same workbook. If the source PivotTable report is in a different workbook, copy the source report to the workbook location where you want the new report to appear. PivotTable reports and PivotChart reports in different workbooks are separate, each with its own copy of the data in memory and in the workbook files.

#### **Changes affect both reports**

When you refresh the data in the new report, Excel also updates the data in the source report, and vice versa. When you group or ungroup items in one report, both reports are affected. When you create calculated fields or calculated items in one report, both reports are affected.

#### **PivotChart reports**

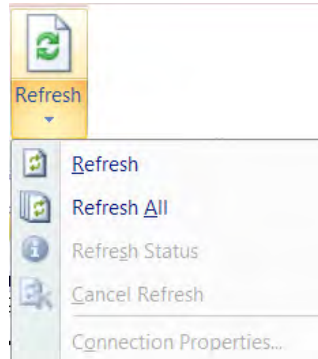
You can base a new PivotTable report or PivotChart report on another PivotTable report, but you cannot base it directly on another PivotChart report. However, Excel creates an associated PivotTable report from the same data whenever you create a PivotChart report, so you can base a new report on the associated report. Changes to a PivotChart report affect the associated PivotTable report, and vice versa.

### Changing An Existing Report's Source Data

Changes in the source data can result in different data being available for analysis. For example, you may want to conveniently switch from a test database to a production database. You can update a PivotTable report or a PivotChart report with new data that is similar to the original data connection information by refreshing the report.

To include additional data or different data, you can redefine the source data for the report. If the data is substantially different with many new or additional fields, it may be easier to create a new report.

### Displaying new data brought in by refresh



Refreshing a report can also change the data that is available for display. For reports based on worksheet lists, Excel retrieves new fields within the source range or named range that you specified. For reports based on external data, Excel retrieves new data that meets the criteria for the underlying query (query: In Query or Access, a means of finding the records that answer a particular question you ask about the data stored in a database.) or data that becomes available in an OLAP cube. You can view any new fields in the Field List and add the fields to the report. (OLAP cube: An OLAP data structure. A cube contains dimensions, like Country/Region/City, and data fields, like Sales Amount. Dimensions organize types of data into hierarchies with levels of detail, and data fields measure quantities.)

#### ➤ To refresh a PivotTable:

##### Mouse

Click in PivotTable.

- Choose **REFRESH DATA** in the **DATA** group on the **OPTIONS** ribbon.
- Choose to **REFRESH ALL** or just **REFRESH**
- The data is now refreshed and updated new information, field names and changed data is now displayed

***Refresh will refresh just the report you are clicked on. Refresh all will refresh all reports in the workbook.***

### Automatically Refresh Data When A Workbook Is Opened

You can refresh an external data range automatically when you open the workbook, and optionally save the workbook without saving the external data, so that the workbook file size is reduced.

➤ To automatically refresh data

Mouse



- Click a cell in the external data range.
- On the **DATA** ribbon, in the **MANAGE CONNECTIONS** group, click the arrow next to **REFRESH**, and then click **CONNECTION PROPERTIES**.
- Click the **USAGE** tab and Select the **REFRESH DATA ON FILE OPEN** check box.
- If you want to save the workbook with the query definition but without the external data, select the **REMOVE EXTERNAL DATA FROM QUERY TABLE BEFORE SAVING WORKSHEET** check box.

To refresh data when the workbook is opened for a PivotTable report, you can also use the Refresh data when opening the file check box under the PivotTable Data section on the Data tab of the PivotTable Options dialog box.



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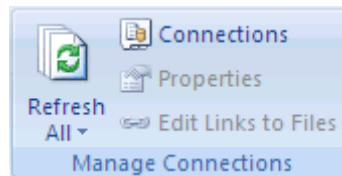
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## Automatically Refresh Data At Regular Time Intervals

### ➤ To refresh at Time intervals

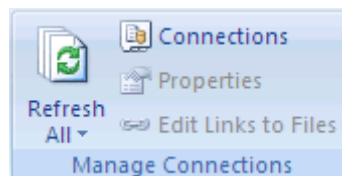
#### Mouse



- Click a cell in the external data range.
- On the **DATA** ribbon, in the **CONNECTIONS** group, click the arrow next to **REFRESH**, and then click **CONNECTION PROPERTIES**.
- Click the **USAGE** tab and Select the **REFRESH EVERY** check box, and then enter the number of minutes between each refresh operation.

## Require A Password To Refresh An External Data Range

Stored passwords are not encrypted and not recommended. If your data source requires a password to connect to it, you can require that the password is entered before the external data range can be refreshed. This procedure does not apply to data retrieved from a text file (\*.txt) or a Web query (\*.iqy).



### ➤ To set a password.

#### Mouse

- Click a cell in the external data range.
- On the **DATA** ribbon, in the **CONNECTIONS** group, click the arrow next to **REFRESH**, and then click **CONNECTION PROPERTIES**.
- Click the **DEFINITION** tab and clear the **SAVE PASSWORD** check box.

*Excel prompts for the password only the first time that the external data range is refreshed in each Excel session. The next time that you start Excel, you will be prompted for the password again if you open the workbook that contains the query and attempt a refresh operation.*

## Grouping PivotTable Items

Data can be summarised into higher level categories by grouping items within PivotTable fields. Depending on the data in the field there are three ways to group items:

Group selected items into specified categories.

Automatically group numeric items

Automatically group dates and times

### ➤ To group selected items:

#### Mouse

- Select the items to group. Select adjacent items by clicking and dragging or non-adjacent items by selecting each item whilst holding [CTRL].
- Choose **GROUP** from the **OUTLINE** group on the **DATA** ribbon.

	A	B	C	D	E	F
3	Sum of GROSS	Column Labels				
4	Row Labels	Australia	Canada	Germany	Great Britain	Grand Total
5	Group1					
6	january	860		2369.75	840	4069.75
7	february	1674	895.65		925.3	3494.95
8	march	280.55	1775.65	780	840	3676.2
9	2nd Qtr					
10	april	1444.75	389	1120	589	3542.75
11	may	350	1469	651	830.6	3300.6
12	June	950	802	392.35	1848	3992.35
13	3rd Qtr	1910.75	1055.5	1749.625	4017.3	8733.175
14	4th Qtr	3454.25	600	7499.8	5915.15	17469.2
15	Grand Total	10924.3	6986.8	14562.525	15805.35	48278.975

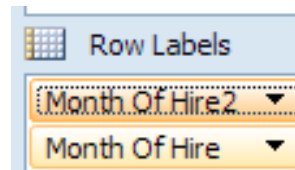
- A group is created:
- Repeat procedure until grouping is complete
- Click on a group name (E.G. Group1) Then type in the name you wish to call this group in the example above the months have been grouped and named as quarters
- The + and – buttons in front of the group names allow the collapse and expansion of the groups to see the data for the subgroup.

You may even group several groups together

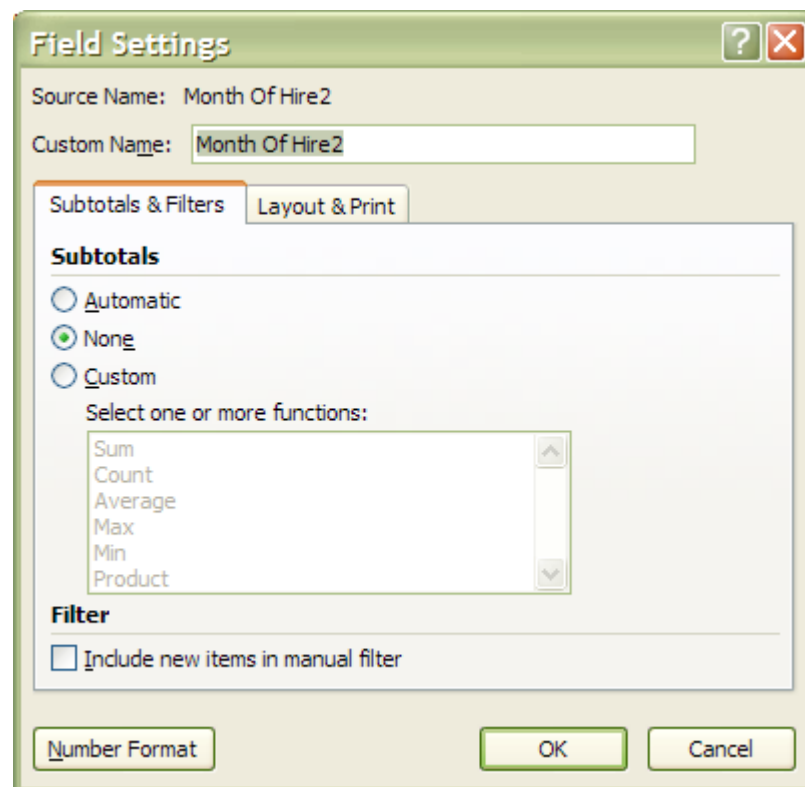
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- To rename a group.

Mouse



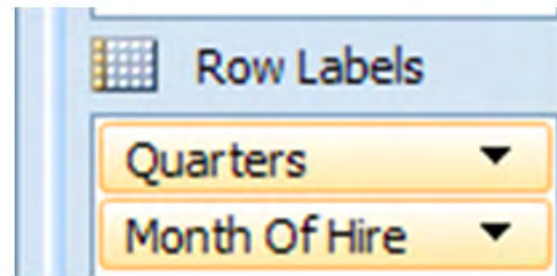
- The row labels now have a duplicate field name with a number following the name. Click on the drop down arrow to the right of the field name, and select **FIELD SETTINGS**.
- the following dialog will appear



- Enter a new **CUSTOM NAME** that would best describe the group. Such as **QUARTERS**.
- Click **OK**
- The field has changed names not just within the Row label area but also in the field list section where it can be used within this report until it is ungrouped.



- ☐ NUM
- ☐ FIRST
- ☐ LAST
- ☒ DIVISION
- ☒ DEPT
- ☐ Risk
- ☒ Month Of Hire
- ☐ DATE of HIRE
- ☐ HRS
- ☐ HOURLY RATE
- ☒ GROSS
- ☒ Quarters







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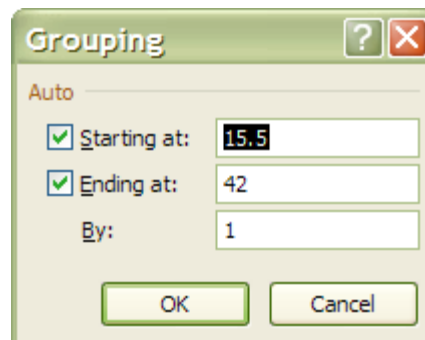
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➤ To group numerically

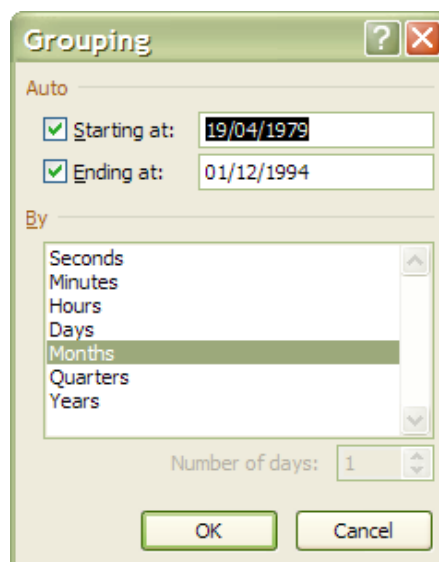
Mouse



- Select a single item.
- Choose **GROUP** from the **OUTLINE** group on the **DATA** ribbon
- Excel displays a dialog box in which to enter starting, ending and interval values. Enter appropriate values
- Click **OK**.

➤ To group a date or time in a range:

Mouse



- Select a single item.
- Choose **GROUP** from the **OUTLINE** group on the **DATA** ribbon

- c) Excel displays a dialog box in which to enter starting, ending and interval values.
- d) Enter appropriate values and click **OK**.

If you are experiencing problems analysing list data check the following:-

*Your list is correctly set up with the first row containing the column labels identifying data in each of the columns and no blank rows between the headings and the first row of data.*

*Your column headings are not ambiguous - i.e. they cannot be confused with function names or range names.*

*Your column headings are formatted to make them stand out from the data.*

*Your column headings ideally should not contain spaces - you can remove the spaces completely or replace them with an underscore (\_) character.*

*Your criteria range should only contain a row of headings and blank rows below. The headings must exactly match the headings at the top of your list.*

*Problems sometimes occur if the criteria range looks blank but perhaps has a space in it.*

### Formatting A PivotTable

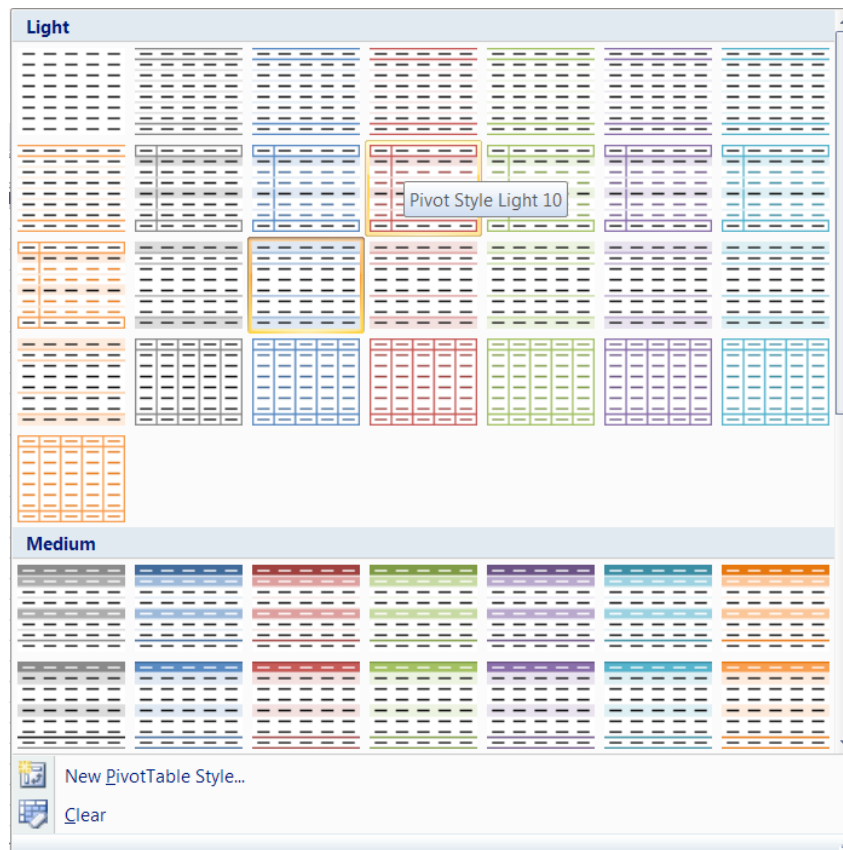
After you have added the fields, displayed the appropriate level of details, created calculations, and sorted, filtered, and grouped data the way that you want in a PivotTable report, you often want to enhance the layout and format of the report to improve readability and to make it more attractive. There are a number of ways to change the layout and format of a PivotTable report as described in the following sections.

You can manually format a cell or cell range in PivotTable report by right-clicking the cell or cell range, by clicking **FORMAT CELLS**, and by using the **FORMAT CELLS** dialog box. However, you cannot use the **MERGE CELLS** check box on the **ALIGNMENT** group in a PivotTable report.

You can also conditionally format a PivotTable report

#### ► To apply a PivotTable style

- a) Click the PivotTable report.
- b) On the **DESIGN** ribbon, in the **PIVOTTABLE STYLES** group
- c) Click a visible style, scroll through the gallery, or to see all of the available styles, click the **MORE** button, at the bottom of the scroll bar.



It's only an opportunity if you act on it

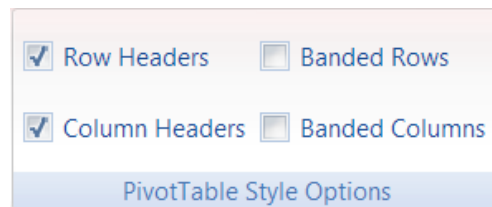
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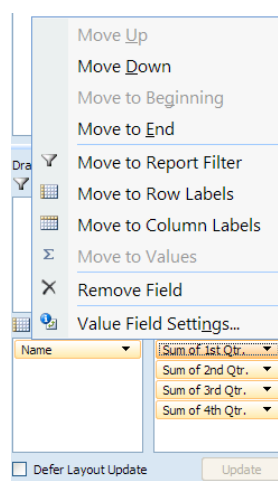
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**OR**

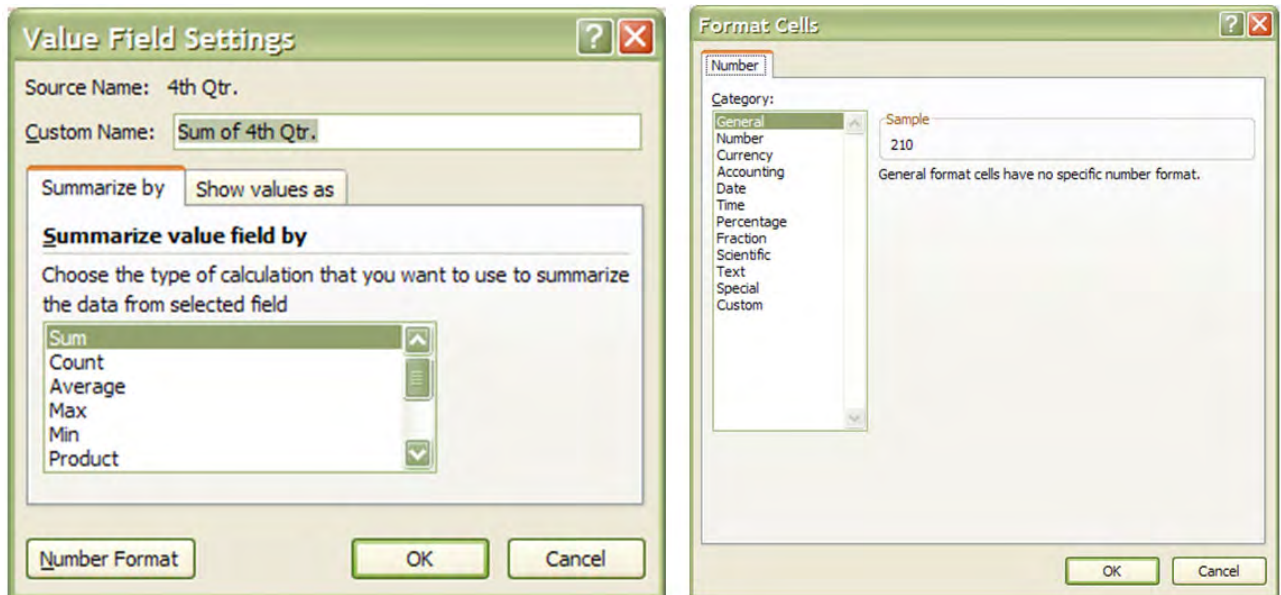
- a) If you have displayed all of the available styles and you want to create your own custom PivotTable style, click **New PivotTable Style** at the bottom of the gallery to display the **New PivotTable Style** dialog box.

➤ **to apply Banding**Mouse

- a) Click the PivotTable report.
- b) On the **DESIGN** ribbon, in the **PIVOTTABLE STYLE OPTIONS** group, either:
- To alternate each row with a lighter and darker colour format, click **BANDED ROWS**.
  - To alternate each column with a lighter and darker colour format, click **BANDED COLUMNS**.
  - To include row headers in the banding style, click **ROW HEADERS**.
  - To include column headers in the banding style, click **COLUMN HEADERS**.

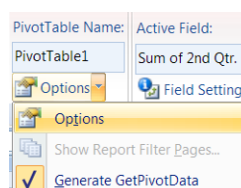
➤ **To Change the number format for a field**Mouse

- In the PivotTable report, select the field for which you want to change the number format.
- On the **OPTIONS** ribbon in the **ACTIVE FIELD** group, click **FIELD SETTINGS**. The **FIELD SETTINGS** dialog box is displayed for labels and report filters, and the **VALUES FIELD SETTINGS** dialog box is displayed for values.
- Click **NUMBER FORMAT** at the bottom of the dialog box. The **FORMAT CELLS** dialog box is displayed.
- In the **CATEGORY** list, click the format category that you want.
- Select the options that you want for the format, and then click **OK** twice.



➤ **Preserve or discard formatting**

Mouse

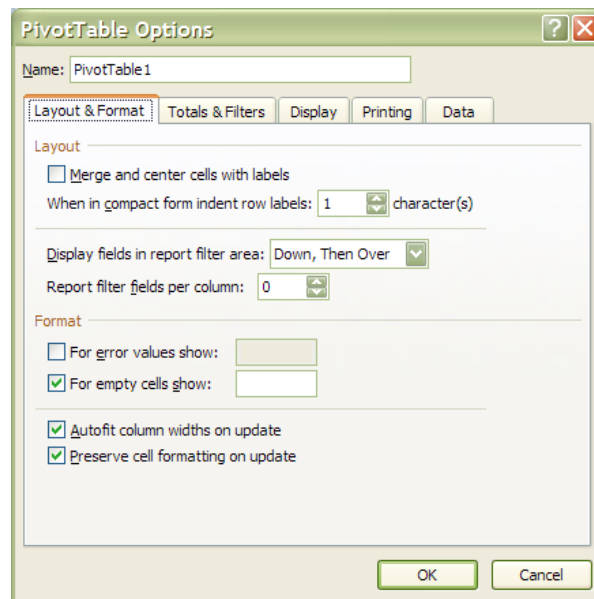


- Click the PivotTable report.
- On the **OPTIONS** ribbon, in the **PIVOTTABLE** group, click **OPTIONS**. The **PIVOTTABLE OPTIONS** dialog box is displayed.
- Click the **LAYOUT & FORMAT** tab, in and look at the **FORMAT** section

- d) To save the PivotTable report layout and format so that it is used each time that you perform an operation on the PivotTable, select the **PRESERVE CELL FORMATTING ON UPDATE** check box.

**OR**

- a) To discard the PivotTable report layout and format and resort to the default layout and format each time that you perform an operation on the PivotTable, clear the **PRESERVE CELL FORMATTING ON UPDATE** check box.



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